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EDITORIAL.

A STEADY gold production is being maintained in Australasia. During the first half of the current year the five leading States produced 2,048,006 oz. fine gold, as compared to 2,046,097 oz. during the corresponding period in 1903. New South Wales shows an increase of 40,000 oz.; otherwise the changes to be noted are insignificant.

THE REPORTS of the American Smelting & Refining Company and the Consolidated Mercur Gold Mines Company, abstracts of which we publish this week, will be found of unusual interest. The smelter consolidation is evidently doing well, but what is most surprising is the extraordinary association of mining and metallurgical industries graphically indicated by the map published with the annual report. We reproduce this map. The well-known Utah company, whose report we abstract, presents an interesting feature in the account of the application of the Moore process, a technical description of which we hope to publish at an early date.

OUR DAILY contemporary, *The New York Times*, a newspaper that does credit to the community in which we live, is usually accurate in its editorial comment, even in regard to technical subjects; but last Sunday it went wide of facts in certain remarks concerning deep mining. "The deepest mining shaft" was somewhere "at the Cape of Good Hope," a statement only rendered possible by the modesty of our friends in the Lake Superior copper region, where there are three shafts much deeper—that is, deeper by over a thousand feet—than any anywhere near "the Cape of Good Hope." Tamarack No. 3 attained a vertical depth of 5,000 ft. only a few weeks ago, while the Red Jacket and Tamarack No. 5 shafts stop only a short distance of that profundity.

Into the discussion of the possibility of sinking shafts several miles deep so as to penetrate the suppositious mineral wealth of the earth's interior we need not enter. The subject is one more likely to serve as a lure employed by clever promoters than to interest practical men; for one thing we do know by this time, and that is that man's mechanical ingenuity will enable him to go deeper than the ores which he exploits. Nature apparently has placed her riches

within the horizon penetrable by mine workings, for it is a fact that the deepest mines exhibit the signs of an ultimate exhaustion due to the non-persistence of ore in depth and not to the incapacity of human endeavor.

SIR WILLIAM RAMSAY, during the remainder of his visit to this country, may find evidence to warrant him in revising his dictum that American chemists, as also the English, are far behind the Germans in enterprise and chemical research. Several heads of chemical factories have entered a friendly protest to this view of the work done by them, and insist that while they do not maintain so many chemists for routine work, who plod along regardless of the commercial value of the information being secured, they are always ready to spend money for definite research; and that, on the whole, there is fully as much effective work done here as in Germany. There has been a great increase during recent years in the application of scientific research to technical work, and it is possible that Sir William judged from the conditions prevailing at an earlier date.

IN THE REPORT of Mr. Lewis E. Aubury, State Mineralogist, published on another page, will be found a statistical résumé of mining in California last year. The figures indicate that substantial progress has been made, the total value of the output amounting to $37,759,040, as compared with $35,069,105 in 1902. This is the best showing for a number of years, in fact, since the time when placer mining in the State lost its pre-eminent position as a source of mineral wealth. It is interesting to note that the gold-mining industry is now holding its own, as manifested by the figures of production, which have been maintained at a uniform average for many years. There would undoubtedly have been an increase in 1903 but for the drought which restricted activities in both stamp-mills and placer workings. Of all the industries the production of petroleum has expanded most rapidly, and in quantity of output—although not in value—California now holds first place among the States.

IT IS OBVIOUS that it is high time for metallurgical chemists to drop calculations in terms of KCy and use only Cy. KCy has lost its meaning, for the "potassium cyanide" used in cyanidation contains sodium cyanide, alkaline carbonates, sulphides, and what not, besides potassium cyanide. It reminds one of the small boy who asked his father, a Frenchman, of what they made wine, and was told, *"un peu de tout, même le raisin."* The use of sodium cyanide is on the increase, and a metallurgical world which is getting reports in percentages of potassium cyanide is really using the sodium salt or a mixture of KCy and NaCy. It would be better "to avoid confusion and prevent imposition"—as they say of the use of the hotel cab-service at Niagara Falls—to report in Cy only. By using KCy and Cy terms side by side it will soon be possible for any one to accustom himself to thinking in Cy terms. Once the change is made we shall all become intelligible to one another, whether our work be in South Africa or Mexico.

AT THE PRESENT time about 4,700 stamps are at work on the Rand, out of about 7,200 actually erected. With the existing crushing capacity an annual output of gold valued at $75,000,000 is now being made; if an adequate supply of unskilled labor is obtained, the 2,500 stamps now idle will increase the total output by about $30,000,000, and provide employment for an additional 5,000 skilled Europeans. It is also anticipated that the present crushing capacity of the stamp-mills on the Rand will be doubled during the next five years, if the labor difficulty is solved by the present importation of Chinese. Such an increase in operations would make room for fully 10,000 skilled white workmen, and it should add 50,000 to 75,000 people to the population tributary to the mines. These are the expectations formulated by those in touch with affairs in the Transvaal, and the matter is one of far more than local interest.

RUSSIA'S COAL SUPPLY.

One of the difficulties that confronts Russia in her military operations in Manchuria is that of coal supply for the long single track railway line on which her army is dependent, but this difficulty is not as great as newspapers have stated. About 100 miles by land from Vladivostok an anthracite mine, from which much was expected, was opened early in 1902, and by now is probably connected with the Usuri railway line, permitting shipments to Vladivostok and Harbin. Perhaps also Vladivostok can still get coal from the convict mines on Saghalien. It is a long way from Vladivostok to Harbin, where the Chinese Eastern railway branches off to run to Dalny and to Port Arthur, and that line throughout its 600 miles of track was, until the outbreak of hostilities, mainly dependent on Japanese coal, though a little was obtained from native workings in the interior. The mines near New Chwang, and those near Lu Shang in the Liaotang peninsula, produced coal of inferior quality, and last year were closed. The mines near Yen-tai, north of Liao-yang, made historic by recent fighting, produce better coal, but their output has been small. All these mines, however, are now in the possession of the Japanese, and so far as known there are no considerable bodies of coal opened between Mukden and Harbin, 430 miles. West of Harbin the nearest coal mines of importance so far as known are in the province of Irkutsk, over a thousand miles away. These mines are opened on quite a large scale. Doubtless Russia will have trouble in getting coal to the front, but the difficulties are not as great as might be imagined.

AMERICAN SULPHUR ABROAD.

An interesting event in the mineral industry of America is the successful introduction of Louisiana sulphur into European markets. Several cargoes have already been exported at comparatively low prices, though paying a higher freight than Sicilian brimstone. The quality of the domestic mineral is good, frequently analyzing 99.5 per cent sulphur, it being practically refined in the course of extraction by the Frasch steam process. The primary cost is small, so that with an increasing output, Louisiana will occupy a unique position in competition with the Sicilian monopoly.

This new enterprise in the United States—the largest consumer in the world—attracts particular attention just now, because the Sicilian producers are debating the renewal of their compact for another term of years. The Anglo-Sicilian Sulphur Company, formed in 1896 to control the output in Sicily by an agreement with the miners, which is revised periodically, has so far had a very profitable career. It is not safe to predict the outcome of the keen competition which will ensue. Among the possibilities, however, is an international agreement to divide the consuming territory. In that case the revenue of the Sicilian combination will be materially reduced, as the United States purchases between 150,000 and 160,000 tons of brimstone annually, which is equivalent to nearly one-third of the Sicilian output. While the brimstone war is waged, the participants should not overlook the increasing consumption of pyrite, prompted by the comparatively higher prices asked for crude sulphur.

ADMISSION TO MINES.

The question of admission to mines has important bearings, which are fully appreciated at this time in London because out of all the important gold mines at Kalgoorlie, in Western Australia, the besmirching touch of scandal has lately fallen most heavily, and almost alone, upon these two companies—the Boulder Perseverance and Boulder Deep Levels—which maintained an attitude of secrecy concerning their operations. At most Australian mines there is a regular visitors' day, usually once a fortnight; each person going underground pays a fee, varying from 50 cents to $1.25, which goes to the local hospital or miners' charities. On the stated days the visitors go down in a party under the guidance of a shift-boss. The privilege is intended for shareholders, but, at Kalgoorlie especially, it is not confined to them, simply because it has been proved that market operators will get the information through devious methods, and by admitting them freely to see the workings there is eliminated a good deal of unsavory hanky-panky in share traffic.

There is no better prevention of chicanery in mining than publicity; wrong-doing thrives on mystery. For these reasons it is well for mine managers to acquiesce in an open-door

policy, even though it may entail a little trouble and some loss of time on the part of members of their staff. It is quite certain that the bear raids, which have done so much to undermine the confidence of investors in West Australian mines, would have been impossible if the workings had been accessible to intelligent observers, because undue depreciation of the resources of a mine would have been as unconvincing as those too sanguine estimates of ore reserves, which usually afforded the temptation to the attacks made by clever and unscrupulous operators. In such financial raids the investing public and the professional mining engineer usually suffer, the first financially, and the second in reputation—by being caught between the devil of self-interest and the deep sea of loyalty to employers. It is only the *chunchuses* of the stock market who win. In the best interest of a sound mining business it is desirable that the light of day should be admitted underground, and the recognition of facts be encouraged by those in authority.

THE ROYAL SCHOOL OF MINES.

We learn that the English Government Committee, which has been taking evidence regarding the condition of the Royal School of Mines with a view to improving its administration, has practically decided to amalgamate the School with the City and Guilds of London Institute and to make them a part of the University of London. The School of Mines will thus finally lose its identity, and the courses in mining and metallurgy will become a section of the Engineering, Technology and Science department of the University of London. The course will include parts of the general instruction in engineering, mathematics, physics and chemistry, with lectures and laboratory work in mining, metallurgy and mineralogy; but the exact details are yet to be fixed. The old staff of the Royal School of Mines will disappear, Professor Gowland's present appointment was temporary, but he has proved a capable lecturer; no successor is likely to be appointed to Le Neve Foster; Professor Judd retires under the age limit early next year, while Professor Tilden's time expires shortly. These changes, and the main feature of a fundamental consolidation, will not be carried out at once; but they appear inevitable.

Thus finally is a grand old mining school snuffed out of existence! Another and possibly better technical institution may, or may not, be evolved out of the consolidation outlined above, but we say with the utmost sincerity that the neglect and final obliteration of the school founded by De La Beche, Murchison and Ramsay, and rendered illustrious by Lyon Playfair, Edward Forbes, Warington Smyth, Percy, Tyndall, Huxley and Judd—names every one of which is as a trumpet call to the scientific man—is a disgrace to Englishmen. If there was not sufficient national feeling in the governing classes to appreciate the value of traditions associated with the greatest names in science there might have been enough appreciation of the commercial importance of a school which was the central training college for the men who direct the mineral industries of a world-wide empire. It is truly pitiable; and at a time when educational commissions and engineering societies are visiting the United States to inquire how and why the American people are mentally so alert and technically so progressive, it is a fine thing surely to have the answer come not from this side of the Atlantic, but from England herself, who gathers tribute from every mining region in the world only to be as parsimonious as a village vestry as regards the endowment of a suitable training school for her mining engineers and metallurgists. It is well enough to build battleships, but the national contests of the future will be industrial, and not naval; to neglect the very foundations of industrial advancement is suicidal; moreover, it is infinitely small, for, when all is said and done, the cost of maintaining a national school of mines is to the mining enterprises controlled by Englishmen as the price of a penny bun to a battleship.

The richly endowed and splendidly equipped mining colleges of the United States, scattered over the face of this educationally enlightened land from Boston to Berkeley, give an eloquent answer to the questioning interest of those who marvel at the alert intelligence of the American engineer, and if English technical men have held their own so well it is rather through inherited ability than the aid afforded by the miserably financed institutions which do duty for schools of mines in the various States that fly the British flag.

We are sorry to learn the result of the Committee's deliberations, for another reason. The Institution of Mining and Metallurgy, led by professional men of keen public spirit, has for three years past bestirred itself in an effort to secure a better organization of the Royal School of Mines. In that work they were notably aided by Mr. Hennen Jennings and one or two other distinguished American engineers who to English professional men are as brothers. They tried hard to set such machinery in motion as would yield a suitable scheme for improving the conditions at South Kensington. We understand that the fact that they were American and represented in some cases financial houses of alien origin has been a hindrance to their influence; that the governing authorities should be so shamefully inert themselves and then prove so provincial in their view of the high professional spirit of disinterested men is as astonishing as it is regretable.

We hope to see a vigorous protest from all those who have at heart the well-being of the mining activities of England and her affiliated States, and we trust that this will take such practical shape as will either preserve the identity of the Royal School of Mines or found another worthy of the mineral industry to which the Empire owes so much. Not that we object to the School becoming an annex of London University—that is well enough and presents many advantageous features—but to be merged in a Guilds Institute and then in turn to be swamped amid the general kindergarten teaching of another institution is an end less worthy of the Royal School of Mines of Percy, Huxley and Judd than simple extinction without excuse.

In the meantime, as owing allegiance to an alma mater about to be asphyxiated, in behalf also of the many old students of the Royal School of Mines, now scattered the world over, we desire to take this opportunity of recognizing the engineering esprit de corps and good-fellowship of those American gentlemen who at no small expense of time and trouble have co-operated with other members of the Institution of Mining and Metallurgy in a sincere effort to improve the organization of the Royal School of Mines.

MARKET CONDITIONS.

Sept. 21.

There is very little change in the metal markets. In copper the situation is good, and although current demand is quiet, prices are firmer. Anticipation of a further improvement in consumption has started an advance in futures. Exports continue good, and the trade with Great Britain, Germany and France is considerably larger than last year. Russia also has been a better buyer.

Speculation has caused a reaction in tin, and sales here are reported at less than the cost of importation. Exports from the Straits to America direct so far this year show a falling off, but to Great Britain they have improved greatly.

Lead is in moderate request at unchanged prices. In the foreign market the situation is strong.

Quiet characterizes the spelter market, but prices are firm.

The tone of the iron and steel markets has improved, not so much by any large increases in sales as by the increased inquiry for certain products, and a feeling of confidence among sales agents that demand will steadily improve from now on. This change is most felt in the pig iron market. In finished material the most noted event of the week was the cut in prices of bessemer and open-hearth billets.

The bituminous coal trade shows little change. In Alabama the furnace companies are gradually resuming work at mines shut down on account of the strike. In western territory, Illinois and Indiana coals are still dull, and the markets show little life. In the Pittsburg region the railroad mines continue busy, and there is a notable increase of activity in the Connellsville region. Along the Atlantic seaboard the markets are still quiet.

METALLICS.

Culled from all sources. Our readers are invited to assist this department by sending similar material.

The output of ore from the Swedish iron mines in 1903 was the largest so far recorded, viz., 3,677,520 tons, an increase of 781,312 tons over 1902.

The five chief coal producing countries of the world in order are the United States, Great Britain, Germany, Austria, France and Belgium. In the value per ton at the pit mouth France leads with a valuation of $2.83 per ton in 1902.

Though the United States leads the world in coal production, the United Kingdom is still ahead in output per head of population. The British output in 1903 was 5.5 tons per head, the American slightly less than 4 tons, the Belgian 3.5 tons, and the German about 2 tons.

Operating costs of the nine subsidiary companies in the Rand Mines, Ltd., last year averaged $3.30 per ton for mining; 68c. for milling; 71c. for cyaniding; 54c. for general expenses, making a total of $5.23 per ton of ore treated. The working profit on 1,543,542 tons ore milled averaged $2.98 per ton, equivalent to nearly 57 per cent of the total cost.

The 6,000 tons of slag produced daily by the Carnegie Steel Works is used principally as railroad ballast, and a small quantity is made into concrete and fire-proofing material. For concrete work the crushed slag brings about 10c. per ton at furnace. Slag sand, employed to a large extent to replace river sand at the steel works, sells at 40 to 50c. per ton.

The oil-shale industry of New South Wales appears to be on the wane. The output in 1903 amounted to only 34,776 tons, as compared with 62,880 tons in the previous year. There was but one mine in operation, and it is said that its supplies of shale will be entirely worked out in the course of a few years. Thus, unless some new discoveries are made, the industry will soon disappear in that country.

Sand that is adapted for the manufacture of glass contains little else than silica. As a rule, the nearer it approaches to pure quartz the more valuable it is. The presence of iron, copper, clay, manganese, or organic compounds, is especially obnoxious if the sand is to be used for making a fine quality of glass. In some cases the impurities may be removed by washing, or by burning when there is much organic matter present.

A new commercial alloy, discovered by Richard B. Wheatley, of London, contains strontium, and is the first in which this metal has been made to play any part. The alloy is claimed to have great tensile strength and a beautiful gold color. It may be spun and stamped, and is slightly affected by atmospheric influences. In making the alloy zinc is heated with sulphate of strontium. The alloy contains: Copper, 60.8 per cent; zinc, 37.6 per cent; manganese, .2 per cent; iron, .1 per cent; tungsten, .3 per cent; aluminum, .3 per cent; tin, .4 per cent; strontium, .3 per cent. The inventor says the strontium enables the tungsten to alloy with the other metals.

WESTERN SPELTER PRODUCTION.

In 1903 the ore production of the western smelters was in round numbers 148,000 tons, of which Joplin ores are estimated to have yielded about 113,500 tons of spelter. There was probably smelted about 75,000 tons of ore from the far west, which would account for about 22,500 tons of spelter, giving a total of 136,000 tons for these two districts and leaving 12,000 tons to come from other sources. This distribution is necessarily only approximate, there being no authentic statistics except as to the aggregate spelter production and the ore output of the Joplin district, but it is sufficiently accurate to indicate the relative importance of the chief ore producing regions. Joplin still furnishes upward of 75 per cent of the total spelter production of the West; wherefore the attention which its conditions command in the trade. It is to be remarked incidentally that a considerable proportion of the ore output of Colorado, Wisconsin and some other States is employed for the direct manufacture of zinc oxide.

The zinc ore from Colorado first began to come to Kansas smelters in 1899, but for two or three years the quantity used was comparatively small. The present development of the Colorado trade has been attained within two or three years. It has already had a strong effect on the Joplin trade, because as we look back we can see that if it had not been for the Colorado ore Joplin alone could not have supplied the American demand for spelter, except at a greatly increased price. The Colorado ore is of admitted inferiority as compared with the Joplin, but it can be smelted profitably and the employment of it is increasing. Many smelters, it is true, do not use it at all, and confine themselves to the Joplin market, but others do smelt it in a way and successfully. Experiments are being made to improve the methods of concentration and smelting, and a good deal has already been achieved in those directions.

It is the natural law that high prices stimulate production. It is even now manifested in the Joplin district, where the output can only be maintained at the rate approximating 4,500 tons a week by such a stimulus. It is agreed that the output can not be maintained unless the price for ore of 60 per cent zinc remains at $35 per ton. This condition, however, stimulates the production in Colorado, Wisconsin and elsewhere. The acquisition of new supplies of cheaper and desirable ore is one of the most serious problems now confronting the Western smelters, since the consumptive demand for spelter is restricted by the high price necessitated by the present cost of Joplin ore.

LAKE SUPERIOR IRON ORE SHIPMENTS.

Shipments of iron ore from the Lake Superior region, for the season up to September 1, compare with those of the corresponding period of last year as follows, by ports:

	1903.	1904.	Changes.
Escanaba	2,849,471	1,698,308	D. 1,151,163
Gladstone	40,656	480	D. 40,176
Marquette	1,411,825	818,010	D. 593,815
Ashland	1,950,659	967,969	D. 982,690
Superior	2,684,737	1,916,477	D. 768,260
Duluth	3,766,030	2,148,919	D. 1,617,111
Two Harbors	3,726,476	2,065,833	D. 1,660,643
Totals	16,429,854	9,615,996	D. 6,813,858

The decrease shown this year is 41.5 per cent. It is to be noted, however, that the stocks on lower lake docks, at the opening of the season, were unusually large, so that consumption has not fallen off quite so much as the shipments seem to show.

CONCRETE IN SMELTING WORKS.

In discussing the use of concrete in metallurgical engineering, Mr. Francis I. Havard, of Silberhutte, Anhalt, Germany, submits[1] the following notes concerning the advantages and disadvantages of the concrete flues and stack at the plant of the Anhaltische Blei und Silber-werke. The flues and stack at the works were constructed of concrete, consisting of one part of cement to seven parts of sand and jig-tailings. The cost of constructing the concrete flue approximated 5 marks per sq. in. of area (equivalent to $0.11 per sq. ft.).

Effect of Heat.—A temperature above 100° C. caused the concrete to crack distinctively. Neutral furnace-gases at 120° C. passing through the concrete flue and stack, caused so much damage by the formation of cracks that, after two years of use, the stack, constructed of pipes 4 in. thick, required thorough repairing and auxiliary ties for every foot of height.

Effect of Flue-Gases and Moisture.—The sides of the main flue were made of blocks of 6-in. hollow wall-sections, 100 cm. by 50 cm. in area, covered with 2-in. slabs of metal-concrete. In cases where the flue was protected on the outside by a wooden or tiled roof, and inside by an acid-proof paint, consisting of water-glass and asbestos, the concrete has not been appreciably affected. In another case, where the protective cover, both inside and outside, was of asphalt only, the concrete was badly corroded and cracked at the end of three years. In a third case, in which the concrete was unprotected from both atmospheric influence on the outside, and furnace-gases on the inside, the flue was quite destroyed at the end of three years. That portion of the protected concrete flue near the stack, which came in contact only with cold gases, was not affected at all.

Gases alone, such as sulphur dioxide, sulphur trioxide and others, do not affect concrete; neither is the usual quantity of moisture in furnace-gases sufficient to damage concrete; but should moisture penetrate from the outside of the flue, and, meeting gaseous SO_2 or SO_3, form hydrous acids, then the concrete will be corroded.

Effect of the Atmosphere Alone.—For outside construction work, foundations and other structures not exposed to heat, moist gases and chemicals, the concrete has maintained its reputation for cheapness and durability.

Effect of Crystallization of Contained Salts.—In chemical works, floors constructed of concrete are sometimes unsatisfactory, for the reason that sulphate salts, especially zinc sulphate, will penetrate into the floor, and, by crystallizing in narrow confines, cause the concrete to crack and the floor to rise in places.

OIL INDUSTRY IN CALIFORNIA.

This State has taken the lead as the largest producer of petroleum in this country, its output in 1903 amounting to 24,340,839 bbl., exceeding that of Ohio, the next largest producer, by a good margin. Kern county alone contributed 18,001,148 bbl., and was followed by Fresno county with 2,214,680 bbl., Los Angeles county with 1,960,604 bbl., Santa Barbara with 262,226 bbl., Orange with 1,355,104 bbl., Ventura with 542,902 bbl., and Santa Barbara county with 4,695 barrels.

1 Abstract from *Transactions* of the American Institute of Mining Engineers, September, 1904.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of THE ENGINEERING AND MINING JOURNAL.

MINE VALUATION.

The Editor:

Sir—In the discussion upon the above subject, published in your issue of July 9, Mr. Hoover refers to former correspondence upon the same question, which, however, is not to hand, and he says, "In the example which I gave of 15 West Australian mines having a profit in sight of £10,500,000, I have stated that those mines were valued by the *London Market* (the combined value at the day's quotation) at £14,500,000."

To my mind this statement, without a full demonstration of the precise mode of treatment adopted by the *London Market* is far from clear. If, therefore, Mr. Hoover intends that his letter should be accepted as a good example in mine valuation, and to be followed by outsiders, it is necessary that he should explain more fully what was "the combined share-value at the day's quotation," and how it was treated so as to arrive at the total value of £14,500,000.

Does Mr. Hoover mean that we shall understand that it was the sum of £10,500,000 only, which were valued, or the group of mines mentioned, including that sum, which were valued at £14,500,000?

I would thank Mr. Hoover to state what Institute of Valuers is intended by "the school of proportionate valuers," and how and when that school was constituted.

Will that gentleman also say whether it was intended to extract the mineral at sight, yielding a net benefit of £10,500,000 in 3½ years, as well as what would be the future yearly benefit or income to be derived from a further development of the mines in question. When would such benefit begin, whether at the end of one, two or three years? How long would it continue, and what further expenditure would be required to produce such benefit?

When these details have been decided, how and what system would Mr. Hoover adopt in determining the total value of the mines, and what sum would the total value amount to?

In such a case as that in dispute between Mr. Hoover and Mr. Stephenson, what amount of interest per cent per annum upon capital would these gentlemen allow to a purchaser of the mineral at sight, yielding a profit of £10,500,000, supposing it were to be offered for sale, as, also, the redemption rate per cent?

Probably Mr. Stephenson will be good enough to state what systematic means he adopted in arriving at the value of £4,500,000? and is it to be understood that this sum is the present value of £10,500,000 which Mr. Hoover states is the net profit to be derived from the mineral at sight, or is this sum of £4,500,000 the value of the 15 mines, including the benefit of £10,500,000, and, if so, what further amount of net annual benefit or income did Mr. Stephenson estimate could be realized from the mines, what further expenditure was necessary to insure the estimated income, and what amount of interest per cent would Mr. Stephenson allow, supposing the mines were to be offered for sale, and, further, what would be the redemption fund?

Nothing is more interesting or important in the whole range of mining than the valuation of mines; but it is not understood by the generality, and for this reason, and to assist me and also the public in understanding how, and upon what basis or system mine valuations are conducted in England and in the United States is the only apology which the writer offers for troubling Messrs. Hoover and Stephenson and encroaching upon your valuable space.

At the same time, the writer considers that the gentlemen in question must be considered to be great authorities in the matter, for which reason he is confident that they will make an effort and give a full reply to the inquiries.

F. LOPEZ.

Buenos Aires, August 14, 1904.

GOVERNMENT COAL-TESTING AND FOREIGN TRADE.

The Editor:

Sir—In your issue of September 15, Mr. E. W. Parker gives an interesting account of the coal-testing plant established by the government at the St. Louis World's Fair. Permit me to make a few remarks. It is true, as Mr. Parker says, that operators in the United States have not been able to quote any federal official reports on the analysis and full value of their fuel, but it does not follow that the results published of the tests will remove what he says has been a "serious handicap to our producers in competing for markets," nor does it follow that such reports will have the weight he apparently assumes. American coals have been tried abroad, and such tests as are being made at St. Louis will hardly do much to offset what foreign consumers found out for themselves when burning American coals a few years ago. Then our shippers sent coal to all the markets where American coal is likely a get a footing for some time. The foreign consumer, of course, is interested in sulphur and ash contents and in thermal units, but the matter of chief interest to him is whether the coal he receives is suitable to his needs, or can be had for so much less than coal he is already using, that a change to American coal will be advantageous.

Statements in a government report may help advertise a coal, but foreign consumers will not use unsuitable coal because proximate and ultimate analyses and tests of fuel value at St. Louis gave such and such results. As an illustration of what I mean, foreign consumers have generally complained of the large amount of fines in American shipments. A test at St. Louis will not remove this prejudice, for the consumer will use coal that has traveled a long way and been trans-shipped several times. I might point out also that the precautions named in Mr. Parker's article do not seem likely to be of much service in securing representative lots for testing. A large mine or a group of mines with miles of workings will show many variations in the purity of a seam. How is the average to be known? It seems inevitable that a lot sent to St. Louis will be taken from the best breast rather than the poorest, at any rate from the best mine of a group, and to take a careful sample of the breast from which the coal is taken will hardly show the average of all breasts. Possibly I misunderstand Mr. Parker. If the Survey is to undertake a careful sampling of every mine or group of mines shipping a lot to St. Louis, the results would of course be highly valuable, but the work will probably take a long time. In short, I fear that the results of the tests will be used chiefly for advertising, that the lots which make the best showing will not necessarily represent average shipments, while for securing foreign trade the results will be of doubtful value unless the American producer is to ship on guarantees based on the tests. The price in Europe represents the cost at the shipping port on this side plus the ocean freight and transfer charges on the other side. With low ocean freight rates and low f. o. b. tidewater prices the American producer can undoubtedly sell a large tonnage abroad, and if he will try to ship coal screened as the foreign consumer wants it, the tonnage can be greatly increased.

Undoubtedly American coal will ultimately play a great part in energizing the industries on the eastern shores of the Atlantic. The question of how far it is well to ship coal abroad instead of using it at home is not to the point, since American producers will send coal wherever they can sell it to best advantage.

X. Y. Z.

New York, September 16, 1904.

PYRITE SMELTING.

The Editor:

Sir—I would like to add to my letter of December 7, 1903. Properly conceived answers to the ten questions on pyrite smelting which have been propounded would seem to cover the purely practical features of the art very satisfactorily, but their bearing is too severely practical to admit of as broad a treatment as the subject in general demands, or perhaps I should say, as the requirements of the metallurgical student make necessary. May I suggest, then, in view of the probable perpetuation of the replies in book form, that an extension of the topic along more theoretical and general lines would be welcome to the beginners in smelting, to whom, I suppose, all such publications are ultimately addressed? At the risk of trenching upon your valuable space I will take the liberty of propounding two more questions, in my opinion of a nature to bring out the general relations of the pyritic to the ordinary matting process, and will provide these with the very briefest of answers, more in the hope of evolving the opinions of others than in the expectation of adding a lasting and important part to the completed treatise.

The questions that I would ask and answer are these:

What is the difference in principle between the pyritic and the ordinary matting process?

What is the difference in practice?

Question 1—Before attempting to consider the differences in theory between the two processes, it will be useful to briefly review the state of opinion regarding the chemical reactions which chiefly occur in the ordinary form of matting. In this connection it is the custom to group the phenomena in three classes; the first including those reactions that furnish heat, the second those to which slag formation is due, and the third those concerned in the production of matte. Of the first class, the only one which concerns the present inquiry is the reaction between the oxygen of the blast and the coke, which in this style of smelting has become almost the sole fuel. The products of this reaction are carbon monoxide and carbon dioxide, both of which, being gaseous, tend to escape into the atmosphere. Incident to this reaction is the reduction of the iron and manganese compounds of the charged material, from the condition of peroxides to that of protoxide, and of lime from that of carbonate to the caustic form, fitted to combine with the

silica present and to carry out the reactions of the second class. The latter consist in the combination of the thus prepared and other bases with the free silica, or the re-formation of previously existing silicates—all these products becoming dissolved into slag. Attendant phenomena, as the reduction to the metallic state of small quantities of iron, and the production of heat through the silicatization of oxides, may be disregarded in this connection. The third group of reactions is more obscure, but their net result is the production of matte by the agency of sulphur, which attacks with varying degrees of energy the metals exposed to its influence, allying itself preferentially with the copper, silver and the nickel, and secondarily with iron, lead, etc., and forming fusible and comparatively stable compounds with all of them. This bald statement of accepted fact must serve as a basis of comparison between the two processes.

In pyrite smelting the fuel, instead of coke, is substantially the sulphide of iron. It may be matte which, for the second time, is passing through the smelting furnace; it may be pyrrhotite, or it may be pyrite, which, in descending to that part of the furnace where its fuel properties become available, has parted with a portion of its sulphur. No other sulphide which possesses the requisite properties is found in sufficient quantity to make it available in the process. The reactions produced between the molten sulphide and the air blast are comparable in their heat-making powers with those between carbon and the air; but here the comparison ceases. In pyrite smelting the three classes of reactions previously cited, namely, the heat-making, slag-making and matte-making, are concurrent and coincident to a remarkable degree, which furnishes the first point of theoretical difference between the processes. Thus the heat-producing reaction between the metallic base of the sulphides and the oxygen of the blast has as a secondary and simultaneous effect the production of oxides for the formation of slags, and it is this detail of the reaction which constitutes the indispensable characteristic of the operation and differentiate it from all other smelting processes. In a previous writing, published in THE ENGINEERING AND MINING JOURNAL under the caption, 'Principles of Pyritic Smelting,' I took occasion to point this out as the chief characteristic of the method, and to deduce from it the definition of the process as follows:

Pyrite smelting is that department of blast furnace smelting in which metallic oxides are formed in the furnace.

This effect, which we do not attain in any other smelting process, is peculiar to the pyritic method, and, as before remarked, furnishes its chief characteristic. By this one reaction (or rather by the group of reactions which we are in the habit of typifying by this one) the heat necessary for the work is generated, and the principal slag-making bases necessary for absorbing the silica present are produced. Notice the peculiar reciprocal relations of the matte-making, heat-making and slag-making forces. With a given charge, the heat set free and the amount of oxides formed are in inverse ratio to the amount of matte made. The greater the quantity of sulphides decomposed the greater the quantity of heat generated, the greater the amount of iron driven into the slag, and the less the amount of iron remaining to swell the matte-fall. This feature of the process is very remarkable indeed, and is worthy of much consideration by the student. He should not fail to bear in mind that it is the iron which really does the work, and that without it we could only have the faintest approximation to pyrite smelting. It is idle to speak of zinc as being in any sense a useful substitute for iron in pyritic work. Iron is the key of the process and always will remain so.

The simplest practicable charge for the pyritic blast furnace consists of iron sulphide mixed with quartz. The ready fusibility of the former, coupled with the infusibility of the latter, bring about some significant conditions which are receiving much attention of late. The sulphide melts at a very moderate temperature, say of about 1,000° C., at which the quartz is not in the least affected. When thrown together into the furnace, the sulphide melts before it has got down far, and the liquid tends to descend into the hearth, while the quartz sinks by itself in a mass downward to the tuyeres. The fluid sulphide, getting hotter as it descends through the interstices of the quartz mass, meets the upward current of air from the tuyeres, while both, as well as the quartz, are at their hottest, and in condition to be most quickly acted upon. The reaction that ensues results in cutting away the quartz mass, which is as rapidly added to by fresh fragments from above. Slag is thus produced, while the residue of the melted sulphides forms matte, and both gather in the hearth. No doubt the effective heating of the blast, so often alluded to by contemporary writers, is done by contact with the descending fluids rather than by the hardened masses of partially cooled slag which attach themselves about the tuyeres, forming noses. It is very evident that if a mass of slag stops on the road down its usefulness as a heating medium must soon be lost, for the heat contained in it would be as nothing compared with that necessary to elevate the temperature of the blast noticeably. It is the sinking mass which heats the blast. We may recognize virtually two working zones, the one being that where the sulphides are melted, the other that where the infusible materials await the action of the fused sulphides. This statement, which recognizes the perpetual existence of what I have called the quartz mass, better characterizes the condition of things than that wherein the delayed mass is spoken of as accretionary and accidental—a view got by inspecting the furnace's interior through the tuyeres.

When more complex charges are fed, containing limestone, natural silicates, slag, and perhaps other materials, more complicated reactions will ensue, and somewhat different results will be got. The quartz mass will still exist in form, but its composition will have changed. It will still be infusible by itself, since it is not conceivable that the pyritic process could go on without the aid of the iron oxide in the formation of slag. We may believe that the quartzose materials are cut away by the descending matte stream, something in the manner that ice is cut away by a stream of hot water. It being the freshly formed oxide that unites with the silicious matters, it is evident that the quartz must remain until enough oxide is formed to destroy it. If there is more matte than necessary for uniting with the silica, it brings up in the hearth, carrying in combination with it the gold, silver and copper of the charge.

If we may judge by what they have written, it is the general impression among metallurgists that the controlling reaction of the pyritic furnace should be represented thus:

(A) $FeS + 3O = FeO + SO_2$.

And that this is succeeded by another reaction, in which the ferrous oxide is scorified and added to the slag as silicate. Uncombined oxygen must, according to this view, exist in that part of the furnace, else there would be no decomposition of the sulphide. Also the decomposition, with concurrent production of heat, would be in proportion to the amount of air present. Then the quantity of air present would inevitably govern the smelting, without regard to the incombustible constituents of the charge. According to this view, it would be necessary to have at all times a certain amount of free oxygen in the furnace, else the work would cease, and neither heat, slag nor matte would be produced. Some considerations affecting these results make it seem improbable that this can be precisely the way in which the effects are brought about. Let us suppose a furnace working on the pyritic plan, wholly without carbonaceous fuel. Next let us suppose that a portion of coke be added to the charge, but which remains otherwise as before. The coke having a greater affinity for the oxygen than any other substance present, the effect will be to diminish the quantity of the latter available for decomposing the sulphides, and as a consequence there will be less oxide of iron set free to slag the silica. The matte, being swelled by the addition of the unaltered sulphides, will fall more copiously. The effect of the increased acidity of the slag will be to cause the furnace to run slower, and perhaps to close up entirely from the formation of incrustations about the smelting zone. But such is not the experience. We may add five, 10 or even 15 per cent of coke to such a charge without inducing any such effects, or even without any injurious effects at all. When the coke exists in so large a proportion it is difficult to see how the atmosphere in the shaft can remain in a condition to bring about the real pyritic effects, if they depend so entirely upon the presence of free oxygen, and if we remember that much satisfactory pyritic work has been done with as high a coke charge as twelve and even fifteen per cent, the matter becomes very doubtful. These high coke percentages, which to the everyday view would seem to forbid pyritic work entirely, really allow uncommonly extensive decomposition of the sulphides, evidenced by a high-grade matte product, while the work goes on swiftly and regularly. Much evidence might be cited to prove that the strongly oxidizing powers inhabiting the interior of the pyritic furnace are not so closely contingent upon the assumed presence of free air as has been assumed. In such cases we have not only the presumptive evidence of the coke charged, but that of the evolved gases, which often have been observed to contain free elemental sulphur, sulphide of arsenic, etc., which could not exist in the presence of free oxygen in the heated furnace for a moment. What lessons do we draw from these suggestive facts?

In the first place, may we not question the accuracy of the notion that free oxygen is the governing factor in the case? May it not be that silica rather than oxygen is the controlling factor? My view of what takes place in the carbonless charge I have embodied in the following equation, which seems to me to conform more closely than the other to what is known to occur:

(B) $2FeS + SiO_2 + 2O = 2FeO, SiO_2 + S_2$

This equation indicates the simultaneous decomposition of the sulphide, the slagging of the produced oxide of iron, and the expulsion of the sulphur. The latter will burn if there be free oxygen to combine with it, but if not it will issue from the stack in the elemental form. As a general thing it passes off as a mixture of the two. When it exists in the stock in large proportions it is impossible to burn it all to dioxide. In the converter process the case is the same, a part of the sulphur escaping as dioxide, a part as elemental. In both processes the iron is found to be far more avid for oxygen than the sulphur, whence the latter is kept from combination when there is not enough oxygen for both the elements. From a heat-producing point of view sulphur is not of great importance in either process, although the impression is very common that pyrite smelting owes its existence to the heat-giving effects of the sulphur. I presume that if we were to examine closely into the rationale of such a process as heap-roasting, for instance, we should find that to the oxidation of the iron and not to that of the sulphur were due its principal effects, and that the latter played very little part in the work.

The familiar assumption that the pyritic effects are only possible in the presence of a large proportion of free oxygen seems to be shaken by the foregoing and by other considerations, and it may even be rationally asked if any free oxygen at all is necessary to the process. Evidently oxygen must be had from somewhere, and if we imagine conditions wherein all that contained in the air would be taken up and wherein none in an available state is brought in by components of the charge, it would still be an unsettled question whether the process could go on or not. That it can go on in the presence of 15 per cent of coke is the most remarkable peculiarity of the process yet made out. The probable effects in eliminating the oxygen at a short distance from the tuyeres naturally lead to the important question if the oxygen necessary may not be derived in such cases from the carbon dioxide previously formed by the action of the blast upon the fuel. This is not an unlikely supposition by any means, as analogous reactions are not uncommon. Further research is necessary, however, to settle the subject conclusively. If we assume that the dioxide has such an action, it would put the process on a very different plane from that it now occupies, but would still leave us in the dark as to the extent to which the addition of coke could be carried. It is quite evident that ultimately a point must be reached at which a further addition would be fatal to the process, as taking up all the available oxygen with the formation only of monoxide, which can hardly be expected to have any action on the sulphides, although it is known to have upon certain metals of the iron group. The chemical formula which represents the interaction of iron sulphide upon silica and carbon monoxide is:

$$(C)\quad 2FeS + SiO_2 + CO_2 = 2FeO, SiO_2 + 2CO + S_2.$$

My views as to the function of silica in the pyritic furnace were first published in THE ENGINEERING AND MINING JOURNAL as early as 1897. I positively assert the validity of reaction (C) as the real controlling and characteristic reaction of the pyritic furnace, although not by any means the only one that occurs or may occur therein.

This view of the essential reactions of pyritic smelting would at first thought appear to be contravened by the well-known effects of the iron blast furnace, wherein iron oxides are reduced to lower forms and eventually to metal by the influence of carbon and its monoxide. It may be asked how the oxide of iron, which becomes reduced to the metallic form in the one furnace with the production of more or less of the higher oxide of carbon, can be produced in the other by the reaction of either the metal or its sulphide upon the aforesaid higher oxide of carbon, this being the reverse of what took place at first. It is a sufficient answer, I think, to point out that in the one case we have to reckon on the presence of uncombined silica, whose influence is difficult to overestimate, and which is most certainly the governing agent in the pyritic form of smelting. In the iron furnace this influence is intentionally obviated by the presence of lime, a base more powerful than iron, which removes the acid from consideration.

Equation (A) I am in the habit of calling the iron-sulphur-oxygen reaction, while (B) in my terminology is the iron-silica reaction. In both I assume that the singulo-silicate of iron is formed, which I believe to take place invariably in this form of smelting.

The differences between the slag—and especially the matte-forming activities of the two processes—are exemplified by the behavior of the inferior elements, arsenic, antimony, bismuth and lead, whose expulsion from the pyritic charge affords an unequalled means of purifying the furnace products. A discussion of these effects, or even a further reference to the general question of slag—and matte—formation would occupy too much space for the present, and I will pass on to Question 2—*Differences in practice between pyritic and ordinary matting.*

Neither furnaces nor accessory apparatus have been modified to any extent as yet by considerations of theory. In the early days of pyrite smelting, when light blast and slow driving were the rule, furnaces with straight sides had their advocates, myself among them. Their virtue, probably a real one, has been obscured by the faster and harder rate of driving now in vogue. The universal tendency has been to reproduce the familiar forms of the lead—and copper—smelting furnaces and adjuncts, without regard to possible improvements other than increased size and blowing power. Blast pressures have been increased quite up to the limit of the ordinary rotary blowers, and the tendency being toward still higher pressures, it seems as if piston blowers are likely to become fashionable in this pursuit, especially as it is declared by some practitioners that a high pressure cold blast can be made to serve the same purpose as a warm or hot one of lower pressure. This would seem to be equivalent to saying that the choice is to be determined by which is the cheapest, the cold, hard blast or the warm or hot, light blast. If I interpret the progress and the tendencies of the age aright, the time is not far away when pyrite smelters will be borrowing the furnaces and apparatus of the pig iron makers. In fact, I have for some time believed that we could not do better than put up works in precisely the style of the great iron blast furnace plants of the East to do pyritic work in. The furnaces doubtless would have to be cut down somewhat, but aside from this I can see no alteration that good sense could dictate. The blowing engines, the firebrick hot blast stoves, the charging apparatus, the slag and metal conveying machinery—all these are so much better than the comparatively trivial and labor-wasting tools of the copper smelter that there is no comparison.

HERBERT LANG.

Oakland, Cal., August 8, 1904.

MINERAL OUTPUT OF CALIFORNIA.

The mineral production of California during 1903, as compiled from reports made to the State Mining Bureau at San Francisco, is shown in the following table, which has been received from Lewis E. Aubury, State Mineralogist:

	Unit.	Quantities.	Value.
Asphalt	Tons	41,670	$503,659
Bituminous rock	"	21,944	53,106
Borax, crude	"	34,430	661,400
Cement	Bbl	640,868	968,727
Chrome ore	Tons	150	2,250
Chrysoprase	..	.....	500
Clay, brick	M.	214,403	1,999,546
Clay, pottery	Tons	90,972	99,907
Coal	"	93,026	265,383
Copper	Lb.	19,113,861	2,520,997
Fullers earth	Tons	250	4,750
Gold	..	.....	16,471,264
Granite	Cu. ft.	408,625	678,670
Gypsum	Tons	6,914	46,441
Infusorial earth	"	2,703	16,015
Lead	"	55	3,960
Lime and limestone	..	.....	592,268
Lithia mica	Tons	700	27,300
Macadam	"	605,185	436,172
Magnesite	"	1,361	20,515
Manganese	"	1	25
Marble	Cu. ft.	84,624	97,354
Mica	Tons	50	3,800
Mineral paint	"	2,370	3,720
Mineral water	Gal.	2,056,340	558,201
Natural gas	M. Cu. ft.	120,134	75,237
Paving blocks	M.	4,854	134,642
Petroleum	Bbl.	24,340,839	7,313,271
Platinum	..	.....	1,052
Pyrite	Tons	24,311	94,000
Quartz crystal	..	.....	1,968
Quicksilver	Flasks	32,094	1,335,954
Rubble	Tons	1,610,440	1,237,419
Salt	Bbl.	102,895	211,365
Sand	Tons	7,725	7,725
Sandstone	Cu. ft.	353,002	585,309
Serpentine	"	99	800
Silver	..	.....	517,444
Slate	Squares	10,000	70,000
Soapstone	Tons	219	10,124
Soda	"	18,000	27,000
Tourmaline	..	.....	100,000
Turquoise	..	.....	10,000
Total value	..	.....	**$37,759,040**

In the previous year the mineral production of the State was valued at $35,069,105, showing an increase in 1903 of $2,689,935. Of the total above given, metallic substances, including gold, silver, copper, lead, quicksilver, platinum, manganese, pyrite, iron ore, mineral paint and chrome ore, accounted for $20,954,166; the hydrocarbons including asphalt, petroleum, coal and other organic materials, for $8,210,656, and non-metallic substances for $8,594,218. The largest single item in the list is gold, the output of which amounted to $16,471,264, as compared with $16,910,320 in 1902. Petroleum shows a notable gain, due to the great expansion of the industry in Kern county.

Among other products, copper contributed $2,520,997 to the total, but this is quite a little below the figures for 1902. Labor troubles are responsible for the decline, as the Mountain Copper Company and other producers, owing to strikes, were compelled to close down their mines for a part of the year. The smaller return from copper was counterbalanced to some extent by the increase in quicksilver, the output of which was the largest since 1895.

COAL PRODUCTION IN FRANCE.—The official estimate of the output of French collieries during the first six months of 1904 shows there has been a slight decline in activity as compared with the preceding year. The production amounted to 17,071,811 metric tons, against 17,333,411 tons in the previous semester.

ENGINEERS' ESTIMATES OF COST.

Mr. S. Whinery, in an able paper in a recent issue of *The Engineering News*, discusses the prevalent distrust of engineering estimates, which he admits to be not without excuse, if not wholly justifiable. He undertakes therefore to analyze the causes that so often seem to discredit the more carefully prepared estimates. Into every complete estimate of the probable cost of a projected engineering work the following elements enter: 1, Quantity and character of work to be done; 2, physical conditions under which it must be performed; 3, best method of execution; 4, unit cost of the various items; 5, general expense; 6, market fluctuations; 7, ability and skill of execution; 8, integrity and honesty in execution; 9, fortuitous incidents; 10, assumption that plan and scope of work will not be altered. Mr. Whinery considers that only items 1 to 5 are properly within the scope of the engineer, and argues that he is no better able to foresee the contingencies that may arise under items 6 to 10 than the man of business, and therefore should disclaim responsibility for prophecy concerning them. All of this should be distinctly understood, however, and a statement to accompany an estimate, something like the following, is therefore proposed:

"The surveys and examinations for the proposed improvement have been made with unusual care and thoroughness, and plans and outline specifications have been worked out and considered, with great care; the quantities and the character of the work involved have been ascertained as fully as is practicable before the work is actually under construction, and we have made liberal allowance, where any uncertainty exists in this respect. In estimating the probable cost of the work we have based our figures upon the present market value of materials and labor in the region where the work is to be done. The unit prices applied to the several kinds of work are based upon our personal knowledge and experience, supplemented by all the information we have been able to obtain about the cost of similar work, the special physical conditions that are likely to be encountered in this particular work having been given full consideration. Under the head of general expenses we have added such sums for engineering superintendence, clerical work, and interest and depreciation upon plant as in our opinion should fully cover these items of cost. The estimate assumes that the work will be conducted with the average skill and efficiency. It makes no allowance for possible changes in the plan or scope of the improvement we have outlined, nor for changes in the market value of material and labor. No allowance is made in the estimate for possible improper or dishonest administration; nor for casualties and contingencies which cannot now be foreseen, but which, judging from our experience on work of similar character, should not exceed——— per cent upon the total we have reported."

We do not agree with Mr. Whinery that the engineer is no better able to forecast the uncertain contingencies than the lawyer, financier or man of business. He should know better than they as to the ranges in the prices of the labor and material that he has to do with, better as to the limits, ability and skill in the execution of this kind of work, better as to the general nature of the fortuitous accidents that may happen and the ways of guarding against them, and better as to the probable losses through dishonesty, because all of that is part of the experience that he has gained in the execution of similar work. If he has not done similar work he can not be expected to make a trustworthy estimate, but if he has, he is naturally better able to forecast the chances than the lawyer, financier or man of business who has had no such experience at all. In other words, the modern engineer in order to be successful must necessarily be a man of business himself; and the only ground for placing confidence in the estimate of a business man in engineering matters is when he is something of an engineer himself, which in fact many modern business men are. We think that no blame will be attached to either the engineer or business man for a cost in excess of estimate which is due to a defalcation of funds, or a change in the plan and scope of the work after the estimate was made, although the engineer may even foresee the possible advisability, or necessity, for making certain changes from the original plans and can also estimate in advance their probable cost.

We think that Mr. Whinery rather hedged from his original position when he presented his proposed explanatory note to accompany an estimate, which is in our opinion fairly well expressed, except it does not go quite far enough, because the engineers can say:

We have based our figures upon the present market value of materials and labor in the region where the work is to be done. These values are — per cent above (or below) the average of the previous 5 (or 10) years. The general trend of the market has recently been upward (or downward). The proportion of labor in the total estimate of cost is — per cent; of materials, — per cent; etc.

One of the questions that is frequently asked the engineer is, What would be the effect of a reduction in the prices for labor and material? Plans and estimates for a certain work have been prepared. The work has been deferred. A year later, the engineer is asked what will be the cost of the work then. A large work, to run through a series of years, is to be undertaken. The prices for labor and material are bound to change during that period. At the beginning they may be at the lowest on record, close to bed-rock, with every prospect of an upward trend in the markets. The engineer should know this; it is his business to know it; and if he bases an estimate on the minimum prices he is as much to blame as if he were at error in his quantities.

Mr. Whinery's suggestion to distinguish clearly between the more and less certain parts of an estimate is praiseworthy. It is analogous to the discrimination of "positive ore," "probable ore" and "possible ore" by the engineer valuing a mine. Either in estimating the cost of a works or the value of a mine it is the engineer's business to express an expert opinion, and in rendering only a partial opinion, leaving some one else to draw the final conclusion, in order to shield himself from responsibility, he is derelict in his duty. A deliberate overestimate is as reprehensible as an underestimate. The commercial purpose of an engineer's estimate is not merely to indicate how much money is going to be required, but also to serve as a basis for calculation of the probable return on the money.

There are plenty of engineers in practice who are able to estimate closely what work will actually cost, as proved by experience. They command large fees, and properly, for their work involves technical and business knowledge of the highest order. The financier should see that he gets this kind of engineer, and when he is sure that he has, be careful not to obtrude his own less expert knowledge. Fair industrial projects are not infrequently rejected as not good enough, because a sound engineering estimate of cost is increased 25 per cent, 33⅓ per cent, or more "on general principles" by the "business man whose previous experience has been gained at the expense of defective engineering advice."

COAL PRODUCTION OF AUSTRIA.

Austria is one of the large coal producing countries of Europe, ranking third, and the total output of the somewhat scattered coalfields is about that of the State of Illinois. The mineral statistics for 1903, recently published by the Ministry of Agriculture, are of interest, and show a small increase in production. The figures are, in metric tons:

	1902.	1903.	Changes.
Coal	11,045,039	11,498,111	I.453,072
Lignite	22,139,683	22,157,520	I.17,837
Total	33,184,722	33,657,631	I.470,909

Labor troubles were responsible for the small increase in the output of lignite.

In the whole empire there were 141 collieries in operation, and these gave employment to 59,698 men, 2,611 women, and 4,354 boys, or altogether 66,663 persons. The production of coke amounted to 1,168,263 tons, for which the consumption of coal was 1,762,653 tons, the yield being 66.28 per cent. Of the total coal production 42.73 per cent was mined in Silesia, 35.78 per cent in Bohemia, 13.90 per cent in Moravia, and 7.09 per cent in Galicia. The three most productive collieries are: Prague Ironworks (Schlan, Bohemia), 636,764 tons; Witkowitz Company (Moravian Ostrau), 651,159 tons; Kaiser Ferdinand Northern Railway (Silesia), 1,053,860 tons. There were 242 lignite mines operated, which employed 55,065 persons. Of the total production, 82.87 per cent was mined in Bohemia and 11.29 per cent in Styria. The three most productive mines were: Brüx Coal Company (Brüx), 2,673,011 tons; North Bohemian Coal Company, 1,820,228 tons; Bruch Coal Company, 1,785,813 tons.

The exports of coal from Austria are chiefly to Germany, but also to Hungary, Italy, Switzerland and Bosnia. They amounted in 1903 to 8,025,364 tons.

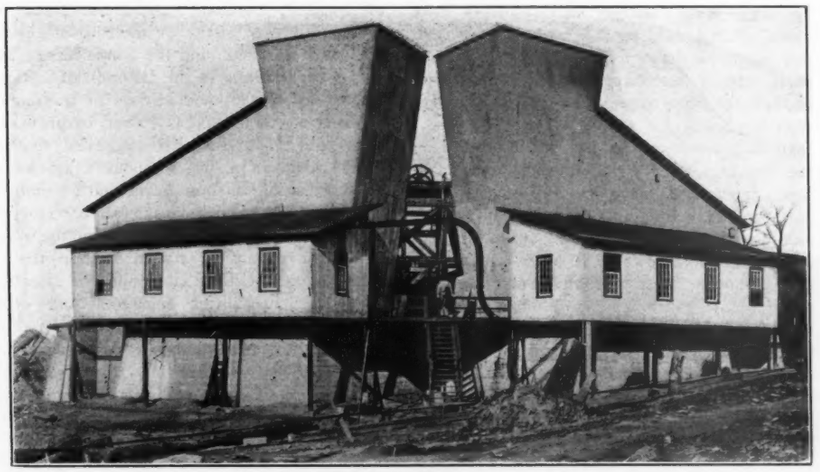
MINING IN COSTA RICA.—The British Consul at San José reports that mining in Costa Rica made good progress during 1903. The output of gold was larger than in the previous year, although the increase was not important. The Union Mining Company has been working steadily, and the Guacimal company has completed its mill and cyanide plant. During the year the Abangares Goldfields Company decided to remove its stamp mill to a site more suitable for the treatment of tailings.

FLINT IN UNITED STATES.—Notwithstanding the fact that the quarries in Wisconsin and Virginia were idle last year, the production in the United States has increased. In 1903 the output was 40,046 short tons crude flint, valued at $38,736, and 15,187 tons ground flint, valued at $118,211. These figures do not represent the entire quantity of flint consumed annually in this country, for much is imported from Europe in the form of rolled flints. The value of flints and flint stone, unground, imported in 1903 is reported by the United States Geological Survey at $101,103.

THE SOUTH WILKES-BARRE COLLIERY.

EDITORIAL CORRESPONDENCE.

The South Wilkes-Barre colliery, one of the largest properties of the Lehigh & Wilkes-Barre Coal Company, is situated in the southern part of the city of Wilkes-Barre, Pa., near the middle of the eastern side of the great syncline in which lie the coal beds forming what is known as the Wyoming region. Several seams are opened at this colliery, there being at least seven of workable thickness in some of the territory tributary to the breaker, but mining has been largely in two seams, the Hillman, 8 ft. thick, and the Baltimore, 16 ft. thick, the latter having a parting of bony coal several feet thick over much of the area worked. The depth of any bed below surface varies considerably, since the measures are crossed by numerous minor folds, some of considerable amplitude, which pitch to the west at low dips.



NEW FAN HOUSES, SOUTH WILKES-BARRE COLLIERY.

Work at this colliery really hardly began until after the completion in 1888 of the breaker shown in the accompanying cut. In that year the total length of the gangways and air ways driven in the solid was about 2,000 ft., while it now approximates 20 miles. In 1901 the colliery produced 476,642 tons of coal and employed nearly 1,000 persons, of whom about 200 worked under ground.

The mine is one of the most gaseous in the anthracite region, and in the total volume of gas given off by the workings is probably the most fiery in the world. Hence the general plan of working, the means of ventilation and the precautions used to prevent the spread of mine fires are of interest.

The main working and air shaft, known as No. 5, is near the breaker, while about a mile southwest an air shaft is being sunk which is part of the ventilating system of the colliery. The main shaft is 1,040 ft. deep and 48.75 by 12 ft. inside the timbering, with five compartments; a downcast 12 by 12 ft.; two hosting ways 7.5 by 12 ft.; an upcast 11 ft. 9 in. by 12 ft.; and a ladder and pipeway 7.33 by 12 ft. No. 3 shaft, near by, has three compartments, and is 970 ft. deep. No. 5 was sunk to work the Baltimore vein; No. 3 to work the Hillman, which lies above. Each shaft is equipped with electric signals and an efficient telephone service.

The two ventilating vans at No. 5 are of the Guibal type, 35 ft. in diameter, one fan being in reserve. The paddles curve backward at the tips, a feature more or less criticised by some engineers in the anthracite region, who believe that paddles with tips radial to the periphery are more efficient. However, it may be said that the fans have done excellent service. The fan-houses are of wood and corrugated iron. Each fan is direct connected to a 20 by 48-in. slide valve engine, made by the Vulcan Iron Works. The usual speed of driving the fan is about 50 revolutions per min., and under ordinary conditions the fan passes about 380,000 cu. ft. of air per min., at 1.8 in. water gauge.

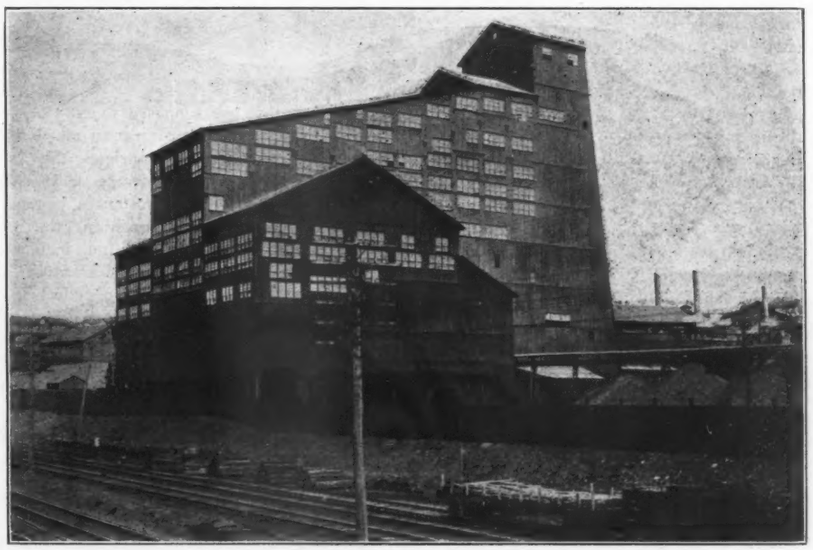
The air shaft, now over 750 ft. deep, has four compartments, an air way, two hoisting ways and a pipe way, and connects with a long slope at the bottom. The twin fan houses shown in the cut are of wood covered with galvanized iron, as are the air ways leading to the fans; these are at an angle of about 70°. Folding doors, which can be shut and opened by starting the idle fan, separate the air ways. The fans are of the same general dimensions as those at No. 5, 35 ft. in diameter, with paddles 11.75 ft. long and 10 ft. wide. Each fan is driven by a direct-connected Vulcan slide valve engine, 20 by 36 in., taking steam at about 100 pounds. Making 45 revolutions per min., the fan now passes about 120,000 cu. ft. of air at 1.9 in. water gauge. The fans and the engines are on substantial concrete foundations.

In spite of the great volume of air used to dilute the mine gases, the main return to No. 5 shaft has sometimes contained, particularly in the spring, as much as 2.5 per cent of firedamp, and since starting the new fans at the air shaft about 2 per cent. This means the workings give off 10,000 cu. ft. of fire damp per minute, or 14,400,000 cu. ft. daily.

To meet these extraordinary conditions the company drives all air ways with a large cross-section, to make easy the circulation, splits the air frequently to avoid long splits, and keeps plenty of air at the faces. Under the State law, only 75 men are allowed to work on a single split or air current; this includes boys and mule drivers. In the South Wilkes-Barre the main air current is split 10 or 12 times, the longest split being about two miles, and the air at the face far exceeds 200 cu. ft. per min. for each person, as required by law.

The room and pillar mining system is used; coal is mined by pick and blasted off the solid. The gangways, air ways and rooms are laid off from maps prepared by the surveying corps. The gangways, driven east and west, follow along the crests or sides of the cross folds mentioned, and are connected by rock tunnels driven through the folds or by slopes and planes. Gangways were driven 12 by 7 ft. on a 0.5 per cent grade for haulage and drainage, with a parallel air way of the same dimensions separated by a pillar 30 to 60 ft. wide, and break throughs for ventilation in driving at 60 to 90 ft. intervals. In some of the later, work gangways and air ways are 14 ft. wide. When, in driving gangways, a new break through is made, the old is closed by a masonry wall 2 to 3 ft. thick. Rooms are driven from the gangways up the dip. In the Hillman vein, rooms are 50 ft. apart, center to center; in the Baltimore, 60 or 65 ft. The rooms are 14 ft. wide at the entrance, increasing to the full width of 24 ft. at 20 ft. in. The rooms are generally in panels of 10, with a pillar three rooms wide separating the panels.

With dips of 12 to 40°, the rooms are worked as chute breasts. The coal is slid down a sheet iron chute, the upper end being kept 10 to 15 ft. from the face, to a platform at the bottom, whence it is shovelled into cars, these cars generally standing on a siding, so as not to impede haulage; if the dip is steep enough the chute may be built out over the gangway. The coal slides on sheet iron at about 18°, and if the dip is less than that the chute is raised as the face advances, where the room is high enough,



SOUTH WILKES-BARRE BREAKER.

to get that inclination; where the coal will not slide it is pushed down by the miner. With dips of 35 to 40° the coal will slide on the bottom without a chute. For dips of 0 to 10° the rooms are worked as road breasts, the mine cars being run in from the haulage road on a track laid up the center. Occasionally, where dips are over 40°, battery breasts are worked; a sort of bin is made by props and plank up the center of the room, leaving a space about 3 ft. wide as a man and air way on either side. The miners stand on the coal; it is run out below when the room is driven its full length. Most rooms in this mine are worked as chute breasts. Owing to the thickness of the Baltimore seam, its being divided in much of the area opened by a seam of bony, and to the poor slate roof in places, several modifications of the general schemes above given are used in working it. The length of the rooms, owing to the cross folds, varies greatly.

In opening ground the most gas is found at the faces of headings and air ways, and in the bottom of air ways. The gas drains off as the workings advance, so that in some rooms it becomes possible to work with naked lights. The rooms are cut by cross-headings driven for ventilation at 60 to 90 ft. intervals. To get the air to the working faces in gangways, air ways and rooms, doors and wood brattices are used exclusively, no auxiliary fans driven by a boy or compressed air motor, nor compressed air jets being employed. In driving a road breast a door is put across the room just outside the last cross-heading, and the air carried to the face by brattice; for a single room with no break throughs, a door is put across the gangway and brattice run along one side of the room to the face. In chute breasts an opening is left in the brattice across the room, large enough for the chute, and this is closed by a curtain of brattice cloth; when these breasts are abandoned the brattice is made solid. The air enters through gangways and passes out through air ways. Doors are not used to separate main splits, but crossovers, well constructed, are relied on.

To guard against fires, a 2.5-in. water pipe is run down every gangway—in some particularly fiery places two lines of pipe; the water being supplied from surface, has a strong head. At convenient intervals along the gangways, 500 to 1,500 ft. according to the gas, heavy 2.5-in. hose, in 50-ft. lengths, is stored. Opposite each room, where gas is expected, a plug is put in the water main for attaching hose. For driving gangways and air ways, and where gas is bad in rooms, dynamite fired by battery is used. Rules governing the use of lights and explosives are strictly enforced. It will be seen that the amount of air circulated is the chief reliance against explosions. Dust is not feared, as anthracite dust is not highly inflammable, hence the coal is not wet down. In this mine if a 'blower,' a stream of gas from a crevice, is ignited, the miners try to beat it out with their jackets; these efforts failing, they get out the hose and fight the flames with water. If the coal and brattice catch fire, in spite of the streams of water, efforts are concentrated on checking the flames and fighting them back. In a serious fire part of the mine may be walled off, leaving the products of combustion to extinguish the blaze. Only as a last resort would the mine, or a portion of it, be flooded. There have been numerous explosions and fires, but none attended by great loss of life, a proof of the efficiency of the working methods and the management.

THE NEED OF STANDARDIZATION.*

By R. M. Catlin.

The mechanic, though ultimately he may be deeply interested in future discoveries, has to do more particularly with the forces and materials as he now finds them, and to adapt them to his purpose at the least possible cost. Of all the items that go to make up cost, labor is generally the greatest; in fact, labor, either directly or indirectly, seems to be the basis of values. And so it is that labor-saving devices are being eagerly sought after. But with old devices it is possible to economize labor by adopting judicious systems in using them. Large manufacturers have found great benefit by standardizing the various parts of their products, so that similar parts may be interchangeable, and to this end invest large sums in preparing standard gauges with duplicates for shop use.

In this connection it has often seemed to me that here we are rather unfortunate, inasmuch as the machinery comes from nearly all parts of the world, and therefore follows no uniform system. Take, for example, the item of threads and screws of all sorts. On nearly every property are to be found a varied assortment. How much time and money, not to mention patience, is lost, absolutely without benefit to anyone, from this cause alone. No doubt each variety may be well enough in its way, but they do not mix well. It may be possible to force them into use, but they do not fit, and in some cases it may result in serious expense and trouble later on. What is true of bolt threads is even more pronounced when applied to pipes and fittings. A leak in a bolt thread is often of no particular importance, but not so in pipe threads. They should fit, and a failure to do so means loss sooner or later. Take another instance—drills. All ¾-in holes logically should be of the same size; but are they? The variation of what is called a blacksmith's hair will do well enough in some cases, but not in all. Flanges are rough sort of things, but for lack of standards how much loss results in even this item? What a considerable loss is met with in almost every job in making things fit that are supposed to fit. The term 'fitter' was once a new term to me, but here it seems peculiarly appropriate. So far as I have been able to determine, it appears to mean one who by circumstances beyond his control is forced to fit something that ought not to require to be fitted, and, incidentally, afterwards to put the various fitted parts together. I do not intend to reflect in any way on the profession, and I am quite willing to admit that the fitter may be a clever workman, and, in some cases, to succeed he must be a perfect genius; but what I mean is that fitting in its literal sense ought to, and can be materially reduced by standardization. Changes in the original plan of any work are expensive if made during construction; one thing rests on another, so that changes that seem trivial in themselves may result in bewildering complications later on. For this reason, if for none other, too much fitting seems undesirable, and it would, no doubt, be much more satisfactory if the various alterations made necessary or developed by these fitting operations could be avoided. It should now be possible to do away with the multitude of variations in what have become standard articles. It seems quite probable that a standard pattern for mortar boxes might now be adopted that would suit all our local conditions. There is very little difference in the rock to be crushed or the work to be done in the mortar box, and there seems no reason why a new pattern should be designed for every new mill. And this is true of a good many other parts of a battery, and, for that matter, of the whole mill. Just before the war, when a great many new shafts were being sunk, each company had to carry a stock of special sized timber suitable for the particular size of its shafts. As they were of various sizes, and there being no uniformity in the system of framing, merchants could not stock the great variety of sizes. A meeting of several engineers was held, and the whole matter was discussed, resulting in the adoption of a standard size of timber, and method of framing to be used in their shafts. Your ex-president, Mr. G. H. Thurston, has suggested that an effort be made to bring about a system of standardization on these fields, and I commend the suggestion to your consideration. So great are the benefits to be derived from the adoption of a system of standardization that it seems quite possible that sooner or later the consulting mechanical engineers and other interested parties may join together in an effort to establish certain standards. Meanwhile, any discussion of the subject by this association, the members of which are in daily contact with the disadvantages of the present system, or rather lack of system, can hardly fail to be of great practical value. Should a system of standardization be adopted, it would be possible to publish details and full specifications of each design, and in calling for tenders on such articles it would then only be necessary to specify the article to be according to the Rand standard, and the manufacturer would know exactly what was expected, and the purchaser would know what the tender was based on. Should circumstances require any special pattern, not standard, special drawings and specifications could be made as now, but in most cases standard designs would probably be used to the mutual benefit of both maker and purchaser.

*Extract from Presidential Address, Mechanical Engineers' Association of the Witwatersrand.

DISCOVERY OF DIAMONDS IN GUIANA.—The discovery of diamonds has been reported from the district of Mindrinetie, Dutch Guiana. Specimens forwarded to Holland for examination showed that the stones are of gem quality. It has been proposed that a commission be sent by the government to investigate the district.

GRAPHITE PRODUCTION.—In the report of Joseph Hyde Pratt to the United States Geological Survey, the production of graphite in this country during 1903 is given as 37,758 short tons, valued at $1,598,589. Crystalline graphite, the most valuable of the natural varieties, was mined in Essex and Washington counties, N. Y.; Chester county, Pa., and Coosa and Clay counties, Ala. The output was 4,538,155 lb., valued at $154,170. The production of amorphous graphite, which amounted to 16,591 short tons, valued at $71,384, came from Georgia, Wisconsin, Michigan, Rhode Island, South Carolina, California, Nevada and North Carolina. Of artificial graphite there was manufactured a total of 2,620,000 lb., valued at $178,670, all of it made by the International Acheson Graphite Company, of Niagara Falls, New York.

THE KLERKSDORP DISTRICT.

BY T. LANE CARTER.

What is known as the Klerksdorp district is not a newly-discovered portion of the Witwatersrand formation. Much prospecting was done there in the early days, and great efforts were made to prove the reefs payable. After the Rand formation was discovered, it did not take the energetic prospectors long to locate the choicest section of the gold-bearing rocks, and in spite of the assertions that we have yet much to find out, it is highly improbable that anything like the rich Central Rand section will be found elsewhere along the main reef series.

The past history of Klerksdorp is far from promising, and after all the money that has been spent, there is not a single flourishing mine to-day in the whole district. That it is a continuation of the reefs of the Central Rand there can be no possible doubt; the great landmark, the Hospital Hill shales, while not so apparent, is easily found; a piece of this shale from Johannesburg cannot be distinguished from a piece picked up at Klerksdorp. Before the war, prospecting was vigorous, as is proved by the numerous trenches and pits. Dilapidated headgears, and old mills show how many mines there were in the early days. At present no more than 25 stamps are dropping in the district.

Discouraging as the results were, a visit to the district convinces one that the outlook is not altogether hopeless, and that Klerksdorp is by no means "done for." Most attention has been given to the Central Rand in the past. Now that expansion is imperative, other districts will be investigated once more. One useful lesson has been learned, namely, that it is not a bonanza district, and if the mines are to pay at all, most careful management is imperative. Given efficient management, and up-to-date mining and metallurgical equipment, it is probable that a few of the Klerksdorp mines will succeed.

The district differs from the Central Rand in this, that while the latter can support mills of 100 to 200 stamps, the Klerksdorp mills must be small, from 15 to 50 stamps. There are two payable reefs on the Central Rand, giving a combined stoping width of nearly 10 ft., while at Klerksdorp the stoping width should be kept at 30 in. Another drawback is that the country is considerably broken up by dike intrusions and big faults. Some parts have a thick covering of diabase. This recent formation, however, does not interfere with prospecting to the same extent as at Heidelberg, the southeastern portion of the Witwatersrand formation.

One factor that has contributed to the failure of the Klerksdorp district is devotion to a fad process, namely, dry crushing and direct cyaniding of the sand. The ore seems peculiarly unfit for this treatment. Panning shows a large percentage of coarse gold, best caught by amalgamation. There was little excuse for using dry crushing, so far as the water question is concerned. The mines are only seven or eight miles from the Vaal river, the fall to the river being slight. Pumping from the river is comparatively simple, and the "lay of the land" is such that large dams could be built to hold the rain water. It is satisfactory to know that "dry crushing" is dead at last. Some of the mines are at present engaged in ripping out the old plants and putting in stamp batteries.

Klerksdorp mines must have hand labor in the stopes. The reefs are thin, and the hanging walls bad. The use of rock drills means, therefore, much wider stopes. A mine near the border line between payable and unpayable, would fail if machines were used in the stopes, but with hand drilling it might succeed. A large number of Kaffir or Chinese drillers is necessary for the success of the district. Development work, of course, can best be carried out with machine drills.

A hopeful fact for the district is the success of one man who is working a small mine on the green quartzites. His operations are of the crudest kind, as crude as anything South Africa has yet seen. All the work is done by animal power. Oxen pull the small buckets full of ore up an impromptu shaft. The ore is mined by Kaffirs, and is gouged out anyway, little attention being given to economical mining. The mine is one big stope from the outcrop downward, no developing drifts being run out from the shaft. One is strongly reminded of the mining of the ancients, except that blasting gelatine is used to pulverize the rock as much as possible. The metallurgical arrangements are even worse. The ore is not crushed at all, but is dumped into a 40-ton wooden vat, the larger pieces of rock being first reduced to egg size. Cyanide solution of unknown strength is put on the ore. The solution carrying the gold runs through a remarkable zinc-box. All that is certain is that excellent results are obtained by smelting the gold-bearing zinc slime at the end of the month. Working in this crude manner, the man, who has a 10-year lease on the claims, is now making a clear profit of £300 to £400 per month. He employs three white men and 40 to 50 Kaffirs. One cannot help regretting the way this small proposition is now being worked. With 15 or 20 stamps and judicious management, the mine should give a recovery value of nearly an ounce per ton.

A company, the West Bonanza, was formed to take over this promising mine, but at the last moment some legal flaw was found in the documents, and the negotiations fell through. It is a great pity, for it is a misfortune for the whole district that the most promising prospect should be worked in the present haphazard style. One flourishing mine would do much for Klerksdorp.

Most attention has been paid to the Buffelsdoorn and Block reef series in the Klerksdorp district, while the green quartzites, just referred to, have received scant attention. Many in the district base their hopes on this formation, and declare that a thorough investigation will open up several rich sections of reef. At one place the green quartzites form a line of hills, and the reef is easily found. Several syndicates are now trenching, with sanguine expectations. The scarcity of native labor greatly retards prospecting operations.

One property is now crushing, namely the Elandslaagte. This company is not on the green quartzites. It was re-constructed in 1894 with a capital of £120,000. There are twenty 850-lb. stamps, and a cyanide plant. The monthly profits before the war were about £500. In spite of labor difficulties they manage to keep the mill running. The reef worked is about 5 ft. wide, but the grade is low, 6 dwt. per ton. The reefs on this property are rather treacherous, and the owners seem afraid to risk a larger mill until more is known of the mine.

In six weeks' time it is expected that the Niekerk mine will be ready with 10 stamps. I went through this mine, and panned some samples. The reef is small, averaging only 10 in., but it is rich in places. The manager is confident that the Niekerk will make a good showing with the ore already developed, but it is impossible to tell how things will look lower down, as the reef just here is rather patchy. Which reef it is, I cannot say. It is very difficult to correlate the reefs in the Klerksdorp district. Some hold that the Niekerk is on a portion of the Block reef, while others declare it is the Elsburg. The mill and cyanide plant being erected at the Niekerk mine is of the most approved pattern. If these mines prove successful many other abandoned mines will be given another chance. There are several. damned by the dry crushing process, which will prove successful now.

The town of Klerksdorp is an old Boer center. Some of the land in the valleys is suitable for agriculture, and there are a few successful farms. At present it is a favorite region for the sportsmen from Johannesburg, as good hunting is found within eight or ten miles. This is at present the terminus of the railroad, but a continuation of the line to the coal-fields, and on to the Kimberley main line, is much desired by the inhabitants.

KLERKSDORP, TRANSVAAL.

TIMBER AND TIMBERING.

BY J. H. BATCHELLER.

(*Continued from page* 431.)

In the system of using double drift sets (Plates III and XIV), at points where long life and power to bear great weight are desired, is another important feature in the timbering practice. These sets are usually put up only where a drift or a station is to be kept open for a long while under a filled stope. As the outside posts and cap in no way affect the inner set, the single set undergoes no break

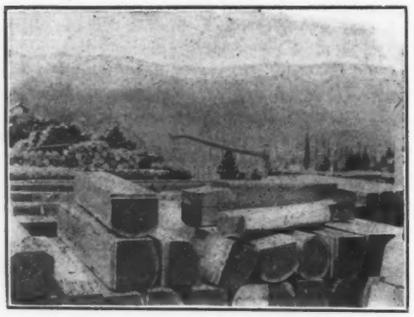


PLATE XIII.

or change where it joins or leaves the double portion.

The use of a uniform system of timbering permits of a saving not only in material, but also in labor. All stope, drift, adit, and shaft sets, and stulls holding filling, are put in 5 ft. apart—center to center. Flooring planks, slabs, lagging and poles are cut a bare inch short of 5 ft. long; so that they can be used equally well in all parts of the mine. Another, though minor point, is that the caps and ties are of the same cross-section; therefore, if required, a cap can always be framed from a tie. The uniformity of system lessens

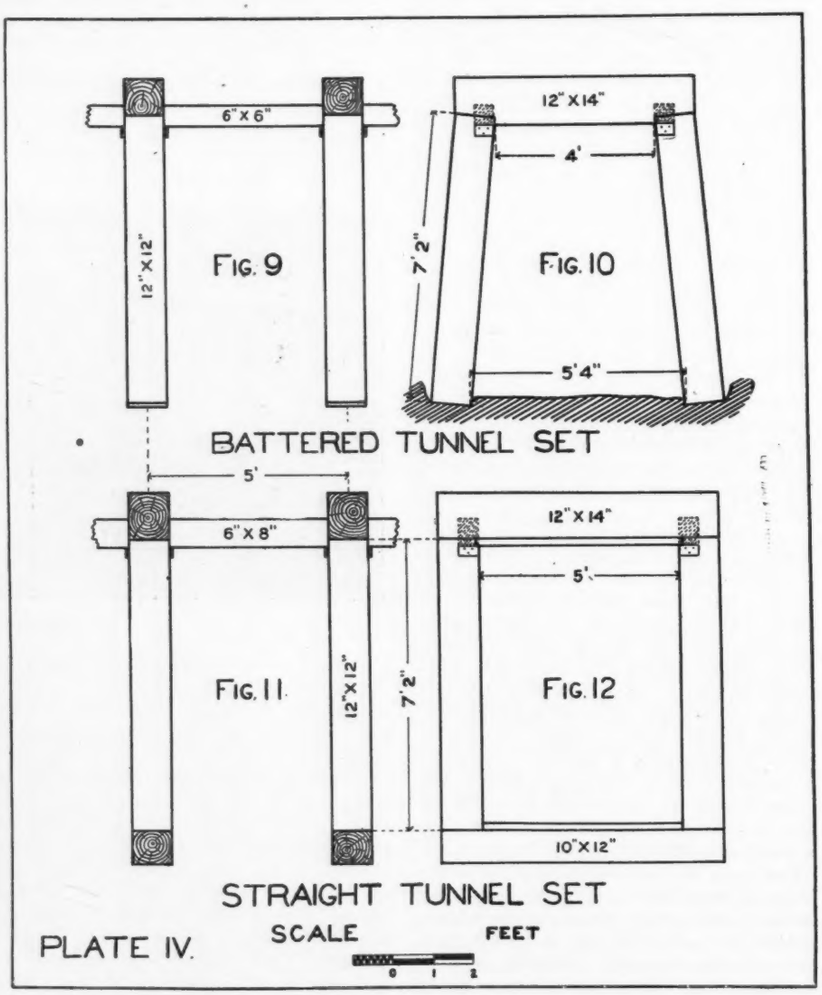
PLATE XVII.

the amount of dimension stuff necessary to hold in stock, and saves many minor delays to the timber gangs underground.

The foregoing remarks cover some of the details of the methods, but are concerned mostly with their economic side. There is, however, an equal or larger number of points that are of great importance to the efficiency of all timbering. Attention can best be called to some of these, in connection with a running comment on the accompanying plates.

On comparing Plates I, II and III, with XI and XII, it will be noticed that the photographs show round stope set posts, while in the drawings they are shown square. They were drawn so purely as a matter of convenience, and, furthermore, though not especially common, posts 10 by 10 in. square occasionally come in from the saw mill. The average size is 11 in. butt diameter. This does not occasion any loss in strength to the square-sets. The cross-section area of the 10 by 10-in. stick is only 100 sq. in., as against 95 sq. in. cross-section of the 11-in. round post. Examination of the details of the bearing surfaces of caps and ties shows that on a 10 by 10-in. post each cap will cover 16 sq. in., and each tie 24 sq. in. The total area of cross-section can be accounted for as follows:

2 caps at 16 sq. in. each	32 sq. in.
2 ties at 24 sq. in. each	48 "
1 tenon, 4 by 4 in. square	16 "
Total surface bearing weight	96 "
Balance remaining unused	4 "
Total cross-section area	100 "



For all practical purposes the 95-sq. in cross-section of the 11-in. post gives as good service as the 96 sq. in. useful bearing surface of the 10 by 10-in. post. There is yet another advantage, besides the economical one already pointed out. Of the two sizes, the round post, though smaller, will invariably be the stronger, because it possesses all the strength of the original outside fibers of the timber, while the squared post is weakened by having them cut.

The figures given above show that the ties have 50 per cent more bearing surface on the posts than the caps. This fact indicates clearly the reason why bulkheads should always be started from the ties rather than across the caps. In the details of a bulkhead (Fig. 4 and 5, Plate I and Plate XII), observe that the planks from which it starts are laid across the ties. In erecting, the lagging is cribbed up till there is not room for more, then blocks are put in and wedged as tight as it is possible to strike them. Owing to their inconvenient position, it is often impossible to jamb the whole bulkhead tight by means of the top wedges alone. To accomplish this, wedges are driven in at the four corners below, over the planks, and the whole structure is keyed up tight. This is of prime importance, for the bulkhead is needed, not only to hold the ground from slacking away, but in steadying the square-sets from swinging when shots are fired near by. It is also important that all newly erected timbers should be tightly blocked and spragged from the ends to the ground; likewise all flat-bottomed posts and helpers, wherever they may be in danger of being shot out. It is only by holding all timbers rigid that stope-sets can be held from 'riding.' When once 'riding' starts, it is not only difficult, but expensive to stop.

The foundation planks of a bulkhead are usually cut with a saw, five inches back from each end, five inches deep, on the sides that overlie the caps; so that when a new post is to be erected on top of one of those by the

bulkhead, one blow from an axe will knock off the 5 by 5-in. block, and make room, without chopping the grit-covered planks, for the foot of the post. As the cedar lagging is softer than the wood in the planks and timbers, the condition of a bulkhead always gives first warning, by its state of compression, of the square-sets taking any excessive weight. Though not shown in the drawing, slabs are frequently used across the ties, between the foundation planks, to serve as a covering to the sets. These slabs never carry any of the weight, but merely keep small rocks from sloughing off on the men below. Bulkhead material can be used over and over, till too badly crushed and broken to bear weight. After that it—and all other useless truck—is thrown into the waste fillings. Where long ties are used, bulkheads are built in exactly the same manner, in units; only two, three or four are erected to correspond with the length of the tie.

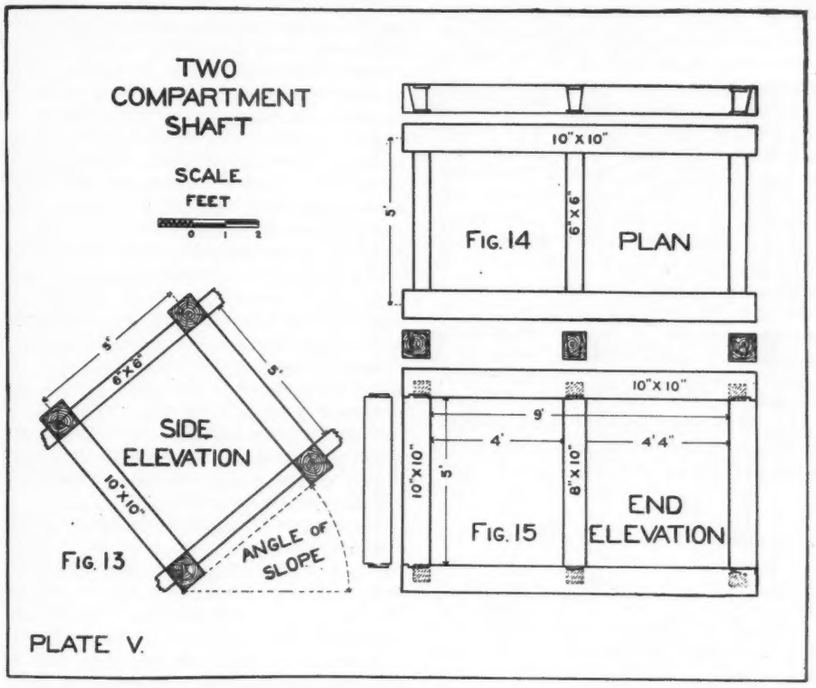
Plate III shows some features of interest. After the timbers around and above the 'tunnel' sets were well secured by filling, the direction of the sets was changed from having the ties point perpendicularly to the direction of the adit and the strike of the vein till the ties lay parallel with the axis of the ore chute. The pitch of the orebodies rarely coincides with the dip of the footwall. Most commonly it lies at some oblique angle. Where the erection of angle-sets begins, it is sometimes necessary to use horizontal braces or sprags, from the straight (the original) sets, diagonally or cornerwise through the angle-sets over to the footwall. This diagonal bracing ceases naturally when the original straight sets are worked out against the hanging wall of the stope; and the connection between the two classes of sets is held by filling.

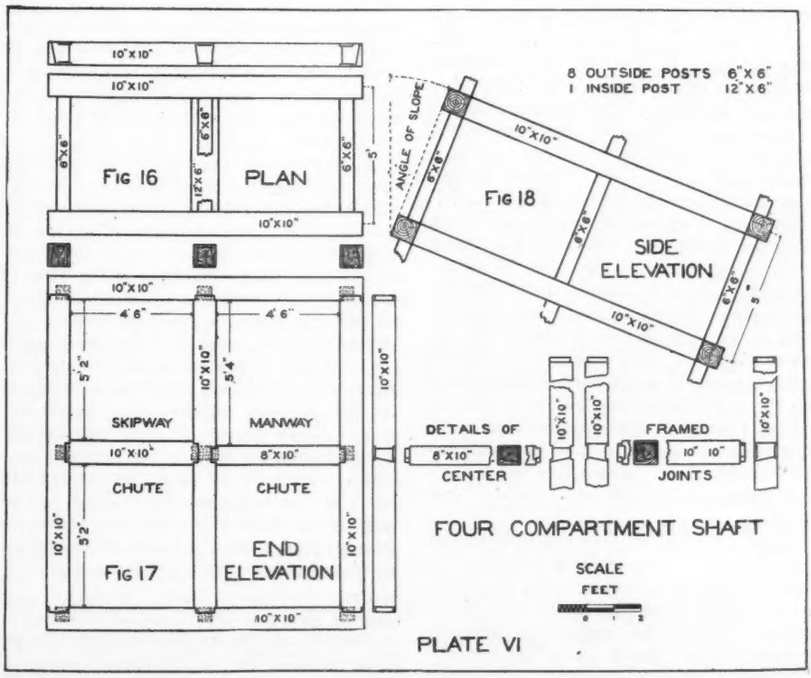
The particular advantage of turning the sets lies in the possibility of keeping the chutes always along in the stope, and those that start in the stope at the sill floor can be carried clear up to the level above. If the sets were continued as begun, perpendicular to the strike, the chutes at one end of the sill-floor would soon run into barren ground above the ore shoot, while at the other end the stope would soon reach diagonally up and beyond the last chute started in ore on the level. From this level, on this side, it would then become necessary to run raises through barren ground in order to get chutes up to the stope for ore. There would be no way to avoid the condition, for the ore chutes could not well be made small enough to turn diagonally up through the stope-sets without their being too small for any service.

Two sizes are used, known as footwall and hanging-wall chutes. The former are 4 ft. high by 3 ft. wide in the clear inside, and the latter 3 by 3 ft. inside. The chute cribbing is round and varies from 4 to 10 in. in diameter. The ends are sawn so as to leave a flat tenon 5 in. long by 3, 4 or 5 in. thick, according to the diameter of the stick. (Plate XIII.) With a 5-in. tenon on each end, and the inside clearance of 3 and 4 ft. respectively, the cribbing measure is 3 ft. 10 in. and 4 ft. 10 in. The inside clearance between stope posts and ties is practically 4 ft. 2 in., so there is ample room in which to build chutes and make the turn necessary where the angle sets start away from the straight sets. Manways are made in exactly the same way as the footwall chutes, 4 by 3 ft., but are always built entirely separate from them on the footwall. The hanging wall chutes are made as branches of the footwall, so that all the ore can be handled from one gangway.

Sometimes stopes are started from the sill floor in a slightly different manner than that indicated on Plate III. Sill-floor posts 8.5 ft. in the clear, with flat bottom and a 4 by 4 by 7-in. top tenon, are used. On top of these regular stope-ties and caps are placed. Pillars of cribbed filling are put in to hold the stope above, and a heavy covering floor is laid over the gangways and stations left open between the pillars. On top of the pillars and heavy flooring are laid the stope sills proper, for the regular 7-ft. square-set posts, entirely independent of the sill-floor below. When this procedure is followed, the single tunnel-set is usually enough, and the cap is braced by means of an extension or heavy sprag put in against the end from a hitch cut in the footwall.

However a stope may be timbered above, it is always started on good sills. These are covered with stout poles to hold the filling against the time when the ore in the floor will be taken out by stoping from a level below. *(To be continued.)*





THE GENESIS OF LIMONITE ORES IN THE APPALACHIANS.

By F. LYNWOOD GARRISON.

The origin of these ores in general may be described as epigenic and superficial, the result of vadose circulation; in other words, the consequence of iron precipitated from waters circulating at or above ground-water level.

The source of the iron can be traced to the neighboring shales and limestones, all of these rocks having supplied some portion of the metal, but, as Hopkins[1] has pointed out, not necessarily all in the same ratio or proportion to the amount of iron they contain. The manner in which the erosion is accomplished has much to do with the disposition of the different constituents. Thus the corrosion of sandstones, shales and slates is mostly mechanical, the included minerals being removed as a sediment along with the other rock components. The limestone, however, is disposed of chiefly by solution, the insoluble elements remaining in place or being swept away and mechanically redeposited.

The solvent power inherent in the water accomplishing this action is mainly due to the presence of organic acids which, acting on the iron in the rocks, dissolves and reduces it to ferrous oxide, which is relatively the most soluble condition. It is probable also that in some cases living *infusoria* play a part in the formation of the ultimate orebodies. Thus, for instance, certain *diatoms* of the species *gallionellæ* appear to construct their shells of iron oxide, that remain after their death as a mass of ocherous iron, which subsequently hardens into a solid iron orebody.

The condition in which the iron is held in solution in the meteoric waters is a matter of interest and importance. It is probably often a carbonate, and may or may not be precipitated as such, depending upon the presence or absence of oxidizing agents that would act upon it; when deposited as a carbonate it may be, and probably has been, converted to ferric hydroxide in place. It is evident, from a careful consideration of the subject, that a large proportion of the iron and also the manganese in the deposits under discussion has been derived from the decomposition of silicates of these metals in the original rock. The iron in these compounds passes into solution as hydrous ferrous silicates, which, on coming into contact with the proper precipitating conditions and media, are thrown down as hydrous ferric oxide and free silica. There is reason to believe that in some deposits this condition has been predominant, as the clays abound in quartz, and the iron ore itself is often shot full of silicious particles, evidently precipitated simultaneously with the iron. Sometimes we find a layer of perfectly pure (i. e., mechanically) iron oxide, immediately covered by another intimately associated with silica, showing that the precipitating conditions have not been regular or uniform.

The state in which the iron originally existed in the limestones and shales is uncertain; in some localities the prevailing iron mineral was probably pyrite, especially in the case of the shales, in others it was perhaps the carbonate (siderite, $FeCO_3$). Again, part of the iron certainly was present in the form of silicates, which were soluble in the acidulated meteoric waters. Perhaps the most reasonable hypothesis would be that the iron was present in the original source in all three conditions as sulphide, carbonate and silicate, the relative proportions being changeable, and, of course, the ratio of extraction governed by this condition and by the solvent intensity of the percolating waters, which must have varied within considerably wide limits. According to T. Sterry Hunt, the iron was probably precipitated as a carbonate and then converted into ferric hydroxide in situ, involving a contraction of volume of 20 per cent, and the change taking place from without inwards; such action tended to form the limonite into hollow masses or nodules composed of concentric layers, the interior of the cavity sometimes containing nuclei of siderite.[2] Hunt also states that large quantities of unaltered carbonate are found in deep and protected workings. While this hypothesis has much to recommend it in certain localities, it can by no means be accepted as a sound general theory covering the whole question; in fact, local conditions demand local hypotheses and no general rule can be wholly accepted. Probably a large proportion of the iron is derived from soluble silicates and directly deposited as a ferric hydroxide. In support of this theory is the fact that iron sulphides are seldom observed in the Cambro-Ordovician limestones and shales, whereas the carbonate and silicates are common.

The analyses published by the Second Pennsylvania Geological Survey show that in fourteen samples of Cambro-Ordovician limestones and intercalated shales there was an average of 1.319 per cent iron carbonate ($FeCO_3$) and in eleven samples 0.178 per cent iron sulphides.[3]

In most of the published analyses of these, or any, limestones the iron is given as an oxide and the pyrite in terms of sulphur. They obviously do not indicate the condition in which the iron actually exists in the rock. A careful investigation with this end in view would probably show, as Genth[4] pointed out many years ago, that soluble iron silicates were present in relatively considerable amount. That they are accountable for the origin of most of the iron there can be no doubt, and it would be instructive to know what relation and proportion the silicates bear to the carbonate and sulphides of iron present in the rock and the ore deposits.

It is certain that the ores are complex bodies composed of a number of different iron minerals or compounds that are present in variable ratio to each other. At times, owing to incomplete oxidation, the humus acids themselves exist in the ore as impurities in the form of basic salts. According to Irving, in the Swedish lake ores traces of chromium, arsenic, molybdenum, nickel, cobalt, zinc and other metals are recorded.[5] The same author also observes that in a state of fresh precipitation the ocherous bog and lake ores may even contain ammonia. There can be little doubt that the silicate of iron often found in bog ores was once held in solution by the agency of humus acids, and it is highly probable that a good deal of such silicate while in solution has undergone decomposition from the action of carbonated water at shallow depths. When a rock contains the iron in its original condition as ferric oxide, organic substances will reduce it first to the ferrous state, which, under the circumstances, in the inevitable presence of carbonic acid, will convert the iron salt into a carbonate.

An important feature of these deposits must be considered in this connection, that is, in cases where the ore gradually blends into limestone and where the more soluble parts of the rock have been replaced by iron salts, the same fossil remains being sometimes found in both ore and rock. These conditions are obviously the result of direct pseudomorphous replacement of the isomorphous calcium and magnesium carbonate. The degree or intensity of replacement is variable; often the rock is superficially impregnated or stained, but to such a degree that it is not easy to distinguish between ore and rock or determine a line of demarkation between the two. Though iron orebodies formed by replacement in limestones are common, it cannot be said they are characteristic of the great Appalachian deposits, especially those in the Cambro-Ordovician rocks. They are exceptional, though sometimes of sufficient size to be important.

The manner in which the iron oxide was collected from its diffused condition in the limestone and shale, its transportation, deposition and accumulation into ore deposits of commercial value, is a subject demanding most careful consideration. Atmospheric waters are nearly always somewhat corrosive, containing, as they usually do when near the surface, traces of sulphuric, carbonic and organic acids. Such waters coming in contact with iron carbonate insure its solution, and in the presence of sufficient oxygen, the dissolved carbonate, sulphide or ferrous oxide is changed into hydrous ferric oxide, which, being comparatively insoluble, is precipitated out and accumulates into masses in any convenient receptacle or nook. Such ore-bodies may, of course, be again attacked by solvent aqueous solution to be re-deposited a second or even a third time in a different place. In this way there is a tendency for these deposits to collect and segregate into large masses of commercial value, though at first they may have been too small and scattered to be of any practical worth. This process of solution, re-solution, deposition and re-precipitation goes on to-day in much the same manner as it ever did. Certainly as forests are removed, swamps drained and streams dried up, this action must decrease, and has perhaps been slowly diminishing since the Carboniferous period.

The organic acids are active reducing agents and necessarily convert the ferric oxide to a ferrous condition; they are evidently an important factor in the transportation of the iron by shielding the soluble ferrous oxide in solution from oxidation and consequent precipitation while in transit. Though the chemical reactions here involved seem simple enough, it is likely that they are in fact considerably complicated by the presence of other salts and bases. The precipitation of the iron in solution is usually ascribed to chemical reaction and oxidation having contributary influences such as relief of pressure, dessication, and concentration or super-saturation. In whatever condition the iron is deposited it almost invariably ultimately reaches the state of ferric hydroxide—a relatively stable condition. A subsequent stage of de-hydration into hematite may ensue, but that phase of the matter is not intended to be covered in this discussion.

[1] *Bulletin* Geological Society of America, Vol. XI, p. 491.

[2] *Transactions*, American Institute of Mining Engineers, Vol. XIX, 1890, p. 10.

[3] *Report M*$_2$, pp. 309, 310, 312, 322. *Report M*$_4$, pp. 80-81. *Bulletin* Geological Society of America, Vol. XI, p. 494. Watson found from 5 to 9.46 per cent of iron oxide (Fe_2O_3) in the Middle Cambrian shales of the Cartersville district, Georgia. There is nothing to show in the analyses given by this author in what manner either the iron or manganese exists in the rock. *Transactions* American Institute of Mining Engineers, Vol. XXXIV.

[4] *Proceedings* American Philosophical Society, Vol. XIV, p. 94.

[5] Proceedings of the Geologists' Association, Vol. XII, pp. 227-238.

The distance from its original source which the iron may be transported in solution depends upon surrounding physical conditions. Thus the descending waters may be stopped in their course by some impervious bed, involving stagnation, during which the iron will be precipitated, or in some cases may result in a metasomatic replacement of the enclosing rock. Either of these results can be effected by the iron-bearing solution taking up the more soluble calcium carbonate in place of the iron; or, as previously intimated, precipitation may be effected by other means.

According to Prime, in Lehigh county, Pennsylvania, the ore deposits follow certain definite lines of outcrop at the junction of the Potsdam and crystalline schists and near the union of the limestone and slates. The orebodies along these lines are, as a rule, richer and more permanent than those of the belts between. The ore is always above the slate, never under it. It was probably formed subsequent to the deposition of the clay.[6] In other words, the dynamic movements and foldings that created the Appalachian mountains brought about physical conditions favorable to the deposition and accumulation of the iron deposits. Emmons states that these limonite ores were formed by leaching and concentration near the surface of the outcrop of the limestone, and were probably formed since the Appalachian uplift at the close of the Carboniferous.[7]

The limonite ores are invariably accompanied by clay; sometimes this is hard, compact and dry, but usually, especially when the deposits are closely associated with the limestone, the clay is soft, tough, and sticky. On the whole, the most favorable conditions for the accumulation of large deposits would seem to be near lines of contact caused by faulting. Distinction must be made between fault deposits and those collected in cavities and caverns in the limestone itself, which perhaps may be at some distance from a fault or line of contact with another rock. The cavern deposits are generally characterized by stalactites, pipes and hollow nodular forms of ore. The fault deposits are, on the other hand, usually massive or composed of solid particles and lump disseminated through the clay, the deposit being occasionally so rich that the clay is almost entirely replaced by ore. In some localities of the South great masses of ore having a vesicular and honeycombed structure are found in this class of deposits. The surfaces of such lumps are irregular and angular, but as a rule they are rich in iron and comparatively free from clay.

According to Hopkins, the loose material resulting from the dissolution of the limestone is inclined to collect in the neighboring limestone cavities by gravitation; and the ore, being heavier than the clay, tends to work deeper toward the bottom of the cave.[8] This statement must not be accepted as a rule, for it frequently happens the best ore is found at a considerable distance from the bottom of the cavities; why it should be so it is difficult to understand, but the fact remains it is not safe to count upon the ore increasing in richness or quantity as the mining operation descends toward the basal limestone. There are often good reasons to expect such an increase, but experience has demonstrated the contrary in many cases. If the clay forms an impervious layer the ore-bearing solutions are certain to be checked in their downward course, but it does not follow from the encountering of such an obstruction that there is warrant to conclude an absence of ore under it, since in so doing we overlook the possibility that the solutions may have penetrated laterally from some point not covered by the impervious clay; and, moreover, the layer of clay itself may be pervious in places.

There can be no question that the accumulation of the ores in large bodies is profoundly influenced by the folding and faulting of the rocks. The general hypothesis to the effect that the ore was segregated as nodules, sheets, lumps, etc., in the cavities, seams and cracks of the limestone, and then left as scattered masses in the residual material remaining after the leaching away of the limestone, cannot be accepted as altogether correct. This theory is admissible only in part, for there has undoubtedly been much secondary segregation in these residual clay deposits, the iron being subsequently dissolved from some places and re-deposited in others more favorably situated, and perhaps containing ore previously left in situ after the removal of the limestone, thus forming a nucleus about which the secondary precipitation took place. Though the process of accumulation of all deposits of this character is epigenetic, they may extend down several hundred feet; in fact, to whatever depth the decay and erosion of the limestone and shales has been effected. The extent of this action may be considered as roughly defining the depth at which limonite ore deposits of this character can be expected. Exceptions to this rule are to be anticipated in the case of fault deposits, since in such instances the downward circulation of the metal-bearing waters will be limited only by the extent of the fault fissure and the pressure they may be able to overcome acting in an opposite direction.

There can be no doubt that the secondary segregation or concentration which takes place in the residual clays is of the greatest importance. It is highly probable that these orebodies in their primary condition were relatively small and scattered and without further augmentation would have been of little commercial value. The obvious and well established principle of ore accumulation by reiterated segregation and concentration is here evident.

Channels through the clay, by which the waters circulate, are common; they are almost invariably lined and surrounded in their immediate vicinity by more or less ore. The distribution of the ore throughout the clay is irregular, showing a tendency to bunch in places while others are nearly or altogether barren. The ore particles range in size from a pin's head to lumps several feet in diameter. When the clay predominates in quantity—as is usually the case—this class of material is called 'wash ore,' since it can only be rendered fit for smelting purposes by mechanical processes of washing and dressing. Instances where the ore occurs sufficiently massive and free from gangue to be mined and smelted without such preparation are relatively uncommon, though cases may be encountered wherever great bodies of wash material abound. Conditions rendering such accumulations possible are certainly exceptional and rare. These general observations apply, at least in some degree, to manganese as well as iron, for similar forces and conditions appear to produce like results with both metals as they exist in the rocks and residual material of the Cambro-Ordovician formations. It would perhaps be more exact to say *on* these strata instead of *in* them, as the ores are mostly only in the residual material; in fact, it is certain that they have accumulated since the folding and distortion of these strata in Carboniferous time and the uplifts that have occurred in later geological periods.

[6] Second Geological Survey of Pennsylvania, *Report D*, 1875.

[7] *Transactions* American Institute of Mining Engineers, Vol. XXII, p. 62.

[8] *Bulletin* Geological Society of America, Vol. XI, p. 497.

DISTILLATION OF ZINC FROM CYANIDE PRECIPITATE.

Mr. G. Howell Clevenger, in a valuable paper read at the New York meeting of the American Institute of Mining Engineers, discusses the nature of the zinc precipitate in the cyanide process and the various methods for its treatment. The entire paper is highly interesting, but in the present abstract the idea is merely to summarize the general conclusions and describe a suggested new process.

Mr. Clevenger concludes that gold and silver are precipitated from cyanide solutions by zinc as alloys or intimate mixtures of those metals with zinc. Of the present methods of refining, smelting with lead after removal of the zinc, is the best. It is possible to remove the zinc more completely, and probably at a less cost, by distillation than by acid treatment, and most of the zinc can likely be recovered in a form at once available for use as a precipitant.

It is proposed, therefore, that the precipitate should be dried, mixed with lead and charcoal, and retorted. If mercury be present, it can be recovered at the beginning of the distillation, the zinc being later condensed as dust suitable for further use as precipitant. The residuum containing the gold and silver should be smelted with lead in a furnace like the ordinary cupellation furnace, iron ore and silica being added in such proportions as to give a fluid slag, from which the lead separates. The slag should be skimmed off and the lead cupelled in the usual way, the resulting litharge being used in the next operation.

There is precedent for the distillation of zinc from material high in gold and silver in the crusts of the Parkes process. It appears, therefore, that cyanide precipitate may be treated in a similar way, adding to it a certain percentage of lead to alloy with the gold and silver and charcoal to reduce zinc oxide and carbon dioxide, and through the formation of carbon monoxide to maintain a reducing atmosphere in the retort. Sulman and Teed have, in fact, retorted the precipitate obtained by their bromo-cyanide process at Deloro, Can., but the bullion produced there was very base, containing about 69 per cent Au and 25 to 29 per cent Zn. Experiments at the Golden Gate mill, at Mercur, Utah, were also unsuccessful, because of failure to reduce the large amount of zinc oxide present. The trouble seems to have been insufficient heat.

Clevenger made experiments with a precipitate containing 16.639 per cent Au, 23.166 per cent Ag, 14.510 per cent zinc (as metal), and 10.060 per cent Zn as oxide. This was distilled in a gas-fired graphite retort. In No. 1, a mixture of 300 grams of precipitate, 500 grams of test lead and 50 grams of charcoal was heated six hours. Of the zinc, 85 per cent was recovered; it assayed 7.2 oz. silver and 0.8 oz. gold per ton. In No. 2, a mixture of 400 grams of precipitate, 1,200 grams of test lead and 100 grams of charcoal were heated six hours, beginning at temperature of 22° C. and finishing at 1,414° C. The first sign of

zinc was noted 45 minutes after the beginning, when the temperature was 671° C. In this experiment there was a smaller loss by volatilization than in No. 1. In No. 3, a mixture of 200 grams of precipitate, 200 grams of test lead and 50 grams of charcoal was heated for five hours. The first zinc appeared at 671° C. At 866° C., 30 minutes after the beginning, 9.2 per cent of the zinc had been distilled. At 1,055° C., one hour after the beginning, 16.1 per cent had come over. The percentage increased rapidly with the time and elevation of the temperature, until at 1,225° C., three hours and thirty minutes after the beginning, 95.4 per cent had been distilled. Finally, at the end of five hours, the temperature being then 1,281° C., the distillation amounted to 99.1 per cent. In No. 4, a mixture of 150 grams of charcoal was distilled five hours, at the end of which time 99.6 per cent of the zinc was driven off, the temperature at the end being 1,296° C. The first zinc appeared at 750° C.

These experiments showed that there must be ample carbon present to reduce the zinc oxide, and that best results were obtained by raising the heat to the proper degree at once and maintaining it there until distillation is completed. It is desirable to heat to about 1,300° C. to remove the last of the zinc. The volatilization of gold and silver is not excessive, and is of no importance, since the zinc can be used again for precipitation. Under certain conditions the zinc can be condensed as dust suitable for use as a precipitate. (Reference may be made to Ingalls, 'Metallurgy of Zinc,' and Convers and De Saulles, United States patent, 695,376, March 11, 1902.) The material in the retort at the end of the distillation is in appearance the same as at the start, but close examination shows small shots of bullion all through it, and usually one or two large masses. It can be poured from the retort like sand; no trouble from sticking. The retort is easily cleaned by throwing in a little metallic lead, and shaking the metallic lead around.

Of considerable interest in Clevenger's experiments is the low temperature at which zinc begins to distill over and the large proportion which came over below the boiling point of the metal. The small loss of gold and silver in distilling off zinc is verified by the experience in distilling zinc ores, Parkes crusts, and the recent experiments of Friedrich, reported in *Zeitschrift für Angewandte Chemie*, 1903, XVI, xii, 269-271.

GYPSUM IN UNITED STATES.—In 1903, reports the United States Geological Survey, the production of gypsum was divided as follows: Crude, 73,912 short tons, valued at $87,608; land plaster, 74,601 tons, $154,945; plaster of Paris, 264,196 tons, $1,078,287; wall plaster, 478,347 tons, $2,472,103; total, 1,041,704 tons, valued at $3,792,943. Compared with 1902, there has been a large increase in output, partly explained by the continued heavy use of gypsum wall plaster in modern buildings. Imports, chiefly from Nova Scotia, in 1903 were 3,526 long tons, ground or calcined, valued at $22,784, and 265,958 tons unground, valued at $301,379. Nearly all the gypsum imported for consumption is calcined and converted into wall plaster. A small quantity is also used as land plaster and as an ingredient of artificial fertilizers.

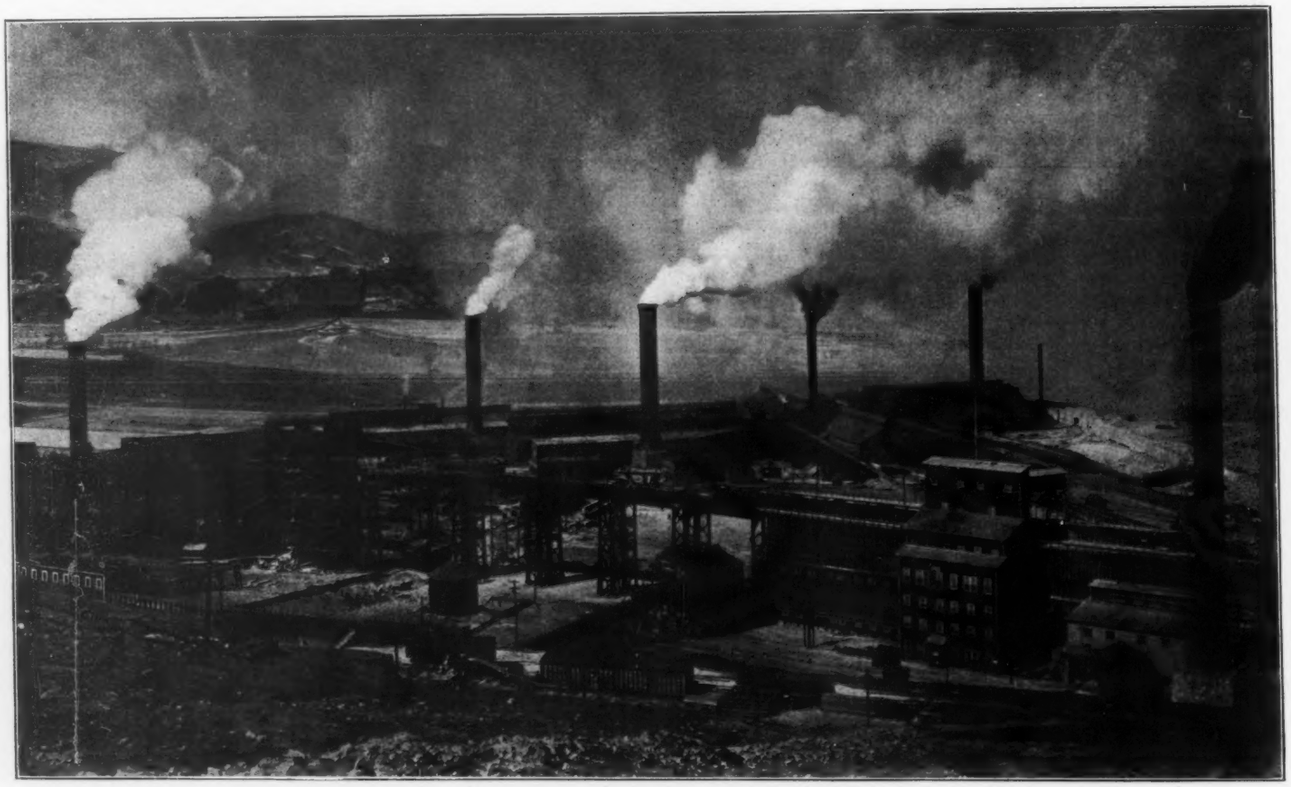
The average yield of gold from the mills and cyanide works of the nine subsidiary companies in the Rand Mines, Ltd., last year was 8.147 fine dwt. per ton, showing an actual extraction of 88.106 per cent.

THE CASUAL OBSERVER AT ANACONDA.

By CHAS. S. PALMER.

The Washoe smelter, at Anaconda, Montana, is the largest and most systematic copper reduction plant in the world.

As one approaches from a distance, the most obvious feature is the giant stack, 60 ft. wide at the base and 300 ft. high, calmly throwing off a volume of smoke that is a permanent part of the scenery of Warm Spring valley. This stream of smoke is composed largely of the fumes of sulphur, the dioxide and trioxide, with their hydrates or water compounds, sulphurous and sulphuric acid. It is an astounding fact that enough fume is carried off to make nearly two thousand tons of sulphuric acid, if it were fully oxidized, every twenty-four hours; but most of this blows off as sulphur dioxide, and it is astonishing how high the smoke is thrown, and how little of it loiters in the region, though the immediate vicinity bears testimony to the destruction of vegetation that has taken place. It is a constant bone of contention between the Anaconda Copper Mining Company and the neighboring farmers, but little of the severe damage extends beyond three or four miles.



THE WASHOE SMELTER AT ANACONDA, MONTANA.
Sampling mill and concentrator in foreground. New flue for big stack under construction.

The great stack carries off all the fumes from the blast and reverberatory furnaces, both of which are matte makers, and also from the calciners and converters, and this explains why the four great steel stacks from the structures just enumerated stand idle and smokeless. They are enormous, 15 to 18 ft. in diameter, but they did not do their work, and so the main flue was built, running up to the top of the little hill which is now surmounted by the great brick stack, with its 30-ft. aperture. This is one of the many illustrations of the progress of the times, and yet it was all taught by the experience at the old works on the north

side of the Warm Springs valley, the hills of which are still crowned with the remnants of the old brick stacks that did duty during the management of Marcus Daly.

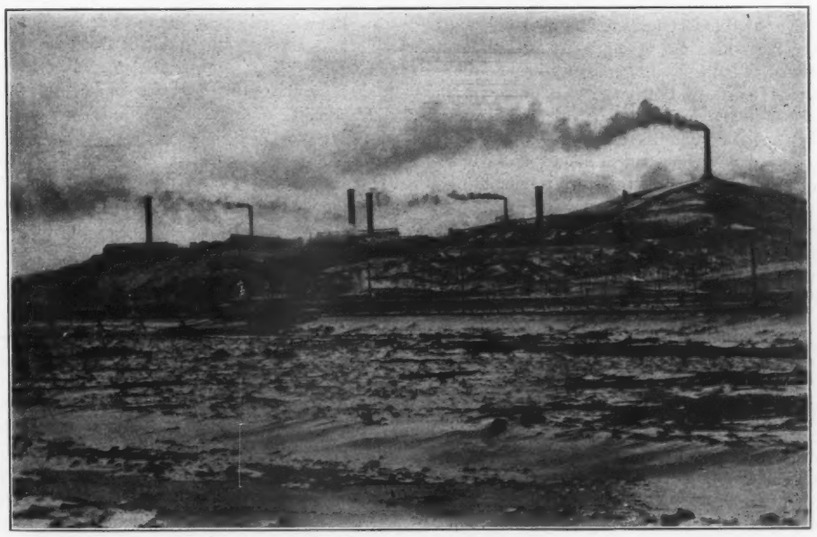
As one approaches nearer, it is evident that the side of a hill comprising sixty acres or more is covered with an orderly assemblage of immense buildings, flues, railroad tracks, tanks, storage bins, etc., etc. The great upper seven-acre building is the concentrator, with the upper power house. In the center and towards the west side of the grounds are the offices, laboratory and drafting room, the storehouses, carpenter shop, arsenic plant, wash-house, stables, etc. Lower down and to the east are the stock bins, the lower power house, the blast furnace building; in the center is the great roaster, containing 48 MacDougal furnaces for calcining the concentrates, and at the lower west end are the two reverberatories, one originally with six and the other with eight furnaces, and the converter and casting building. It is a brilliant sight at night, when the grounds are illuminated with scores of arc lights, to say nothing of the red fire of the furnaces.

On still nearer approach one can recognize the great launders running down the lower side of the hill and above the tracks of the Butte, Anaconda and Pacific R. R., as they discharge their watery burden of tailings, blast slag, cinders, reverberatory slag, etc., while the launder carrying slimes from the concentrator runs down by the west side of the fence to the slime ponds near the track. The tailings are white, the slags are black, and each makes its own mark on the landscape. Approaching closer, one notices the constant screaming of the air locomotives, which are used to transfer the material in the various stages of smelting about the grounds. These locomotives are supplied with high-pressure air, which is compressed at the lower power-house to 900 lb. Accidents are almost unknown, if due care is practised, and yet it is fair to suppose that few of the workers have ever calculated the pressure that the end of one of the air cylinders on the locomotives must hold. It comes near the total weight of five large railroad engines; but the steel is made for that figure. As we step off the trolley car —connecting Anaconda with the works, about two miles away—we enter at the gate, which is about in the middle west of the establishment. Armed with a pass from the general office, the visitor should first go up to the concentrator, where the ore comes in from Butte, twenty-five miles away. Marcus Daly brought the reduction works down to Anaconda because, incidentally, he differed from a certain prominent United States Senator regarding the political ownership of Montana, but chiefly because at Anaconda there was water, water enough to treat the daily bill of fare of five thousand tons of ore. Whether it costs 22 or 32½ cents per ton to carry the ore down from Butte in the 50-ton steel self-dumping cars is a question that we will not touch; but it is interesting to note that Marcus Daly thought and proved that he was paying too much to the Northern Pacific for the transport of his ore from Butte to Anaconda, and consequently he built the present road for his company. The "hog engines" that are used to draw the ore trains are of the large 150-ton size—and they do their work.

Arrived at the seven-acre concentrator, it would be a pity to overlook the fine sample mill, built on the Taylor and Brunton plan. It would be worse to neglect the upper power house, with its large engines, one of which boasts the distinction of serving as the prime mover of the Ferris Wheel at the Chicago Fair in 1903. These engines furnish the supply of electricity for the works and the city of Anaconda, in addition to moving the great concentrator. This concentrator, in its two sections, is really eight mills in one. Each section of the eight is a complete mill, from storage bin and Blake crusher down through trommel and jig, through Huntington mill and sizer, to Wilfley and tank-house, where the concentrates land for temporary storage. The mill has been repeatedly described in detail, and I will only say in passing that one of the last of such descriptions may be found in this JOURNAL of September 12, 1903, by M. Schwerin; but we may note that the general principle of treatment is to crush and roll *gradually* from one size to the next, taking out the value with as little slime-forming as possible. The concentrator furnishes five products, namely, coarse concentrates, roughly the size of a walnut, that go to the blast furnace; fine concentrates, and the still finer "table concentrates," both of which go to the MacDougal calciners; tailings, which go down a water launder to a dump below the smelter; and the slimes, which are taken down to the reservoirs, where they settle and are treated by briquetting. The coarse concentrates will run about six or seven per cent copper, the fine concentrates about seven or eight, the table concentrates about nine or ten per cent. The tailings contain about eight-tenths of one per cent, and the slimes about three per cent copper. On coming down from the concentrator we naturally take a look at the great flue, which stretches for more than a thousand feet to the top of the hill. A very good description of this is to be found in this JOURNAL, under date of December 24, 1903, by an "Occasional Correspondent," but the article was evidently inspired, for it carries the official ground plan of the A. C. M. Co. works. Since this was published there has been erected the small experimental arsenic plant for the extraction of white arsenic from the flue-dust, which carries from 5 to 20 per cent arsenic sesqui-oxide. This plant is using a small roaster of the Brunton type.

Going down by the stock bins and the lower power house, which latter is used exclusively for the supplying of air for blast and power for surface traction, we come to the blast furnaces—seven—of large size and furnished with enormous fore-hearths, where the slag-spouts are pouring in a constant stream of matte and slag, the slag flowing off in a steady stream along a launder. These fore-hearths are a reservoir for matte, which is drawn off into the 10 or 15-ton pots for the converters. The slag from the blast furnaces is very clean, averaging probably about three-tenths of a per cent copper. It is an average copper slag, counting up about 40 per cent silica, 20 lime, and 27 per cent iron. The matte will run from 39 to 44 per cent copper. These blast furnaces treat not only the coarse concentrates and the coarse first-class ore, but also the briquettes from old slimes and tailings, the slag and matte chips from the reverberatory and converter; in general, any smelting waste can be treated by these accommodating metallurgical scavengers.

Next come the MacDougal calciners, where the fine concentrates are passed in at the top of the six-compartment shelf-roasters, and are burnt down from raw, wet, 35 per cent sulphur material to brownish, choking, 7 per cent sulphur cinder. The flame is self-supporting when once started, and the rabbles are water-cooled. From the calciner we follow the produce to the reverberatory, where matte is also made, without any forced draft except that of the main flue, the suction of which is between one and two inches of water. There is no part of this great plant which better illustrates the progress of economical method than this reverberatory. Part of this progress is described in a paper by Mr. E. P. Mathewson in this JOURNAL for August 1, 1903, wherein are noted the improved methods of handling fuel and draft, and especially the saving of the heat by the placing of Stirling boilers just at the end of the reverberatories. This plan has been so far developed that the boilers of the lower power houses seem liable to be put out of commission, except as reservoirs for steam. Another advance is the replacing of each set of two reverberatories by one large furnace, to the making of better economy in fuel, calcine treatment, matte production and power saving. Several of these furnaces, from 80 to 100 ft. long, have already been built, and it is only a



WASHOE SMELTER.
Looking southeast and showing the new big stack.

question of time when the old short style will be replaced entirely by these big furnaces, which will also make most of the steam used about the works. In passing, it should be noted that there is some contention regarding the individual who should have the credit for the saving of all this power. And it can also be remarked that works like the Washoe are not made by any one man or set of men. Each great engineer will register his failures, and will also score his successes, and the credit of the assistants is naturally absorbed by the superintendent, but the progress goes right on.

Next comes the converter and casting building, where the matte from the blast and the reverberatory furnaces is taken in the large cars of the local "air-line." The matte arrives at the converter building still molten, and is poured direct into the converters through curved iron launders. Peters and Hofman, and Hixon also, have so well described the details of this part of the treatment that there is little to add in a sketch like this; but it should be noted that this place is the most brilliant, most active and most dangerous on the grounds. Accidents have happened, as from the earlier failure to bake the linings dry, the over-blowing of matte and mixing with unblown, the spilling matte and slag on water; and except for the risk attending this part of the work, there are very few bad accidents nowadays.

The construction of the converter building is modelled on the modern plan of great open-work, clear-story structure, with 100-ton traveling electric cranes, which handle the slag and matte pots as though they were teacups. The converted copper is taken across the building, and, still molten, is poured into the casting furnaces, where it is poled; this old, old method still being used to bring the metal up to the right standard for anodes. The copper is poured into "cakes," handled and cooled by a casting machine. This anode copper was formerly refined into cathode purity at the large electrolytic refinery over on the north side of the valley; but the metal is now shipped east for further treatment. The anode copper, as finished at the Washoe works, will run about 99.6 in copper, and with some gold and considerable silver, so that all the work thus far is simply one of concentration of values.

As the casual visitor leaves these incomparable reduction works he should pause to take stock of his main impressions. One man will notice this and another that, but the great phenomena, aside from the general magnitude of this 5,000-ton plant, should include the use of compressed air, both in furnace and in surface traction, the fairly successful attempt to save and re-treat the flue-dust, the saving of steam fuel by the harnessing of the reverberatories to the Stirling boilers, and the high degree of purity of the anode copper. Any one coming away from the new works cannot overlook the long string of ruins representing the old works, from the refuse of which thousands of tons of material of every description are being treated every month; and the reflection will thrust itself upon the mind that in a short space of years the new works will in turn become old, and will in turn furnish the secrets of their refuse to the treatment and criticism of later generations. But it is safe to say that nowhere is there such a complete and varied aggregation of machinery, men and system for the cheap extraction of copper, and never will any such sytem better serve its day and generation than the Washoe Reduction Works of Anaconda.

A PLEA FOR BETTER ROADS.*

By Jas. W. Abbott.

The European nations awoke to a fairly clear conception of this question about a century ago. Roads built primarily from military necessities proved to be of such general and far-reaching value that a system of national highway improvement was entered upon both in England and on the Continent. Strange as it may seem, the relative importance of properly-constructed highways was better comprehended by the people generally of the United States a century ago than it is to-day. In 1802, upon the admission of Ohio into the Union, a law was enacted by Congress setting aside 5 per cent of the revenues from the sale of public lands in that State to build highways from the navigable waters of the eastern coast to, and through, Ohio; 2 per cent to be used on roads without the State and 3 per cent on those within. Under this law about $7,000,000 was appropriated and expended in building a great national highway which was known as "The Old Cumberland Road." It extended from tidewater westerly across the Alleghany Mountains through the States of Ohio, Indiana and Illinois, nearly to St. Louis. For hundreds of miles this road was built nearly in a straight line and constructed in a thoroughly substantial manner and after the most approved methods. Its counterpart does not exist in the United States to-day. It was the great artery of that time from the older States to the new farms and cities of the West, and played a very important part in the growth of the country.

In Europe, after the railroad came, it and the common road developed together. The relative place and importance of each seemed there to be understood, but in this country, with the development of our railway system, came neglect and disregard of the highways. The panic of 1837 produced such financial stringency that Congress was compelled to retrench expenditures in all directions. It stopped appropriating money for national highways, and that policy has never been resumed. For more than fifty years the roads of the country were left, as a rule, to take care of themselves. As railroads multiplied and improved the common roads grew worse and worse.

It was not until the introduction of the bicycle that public attention was directed to the subject. The sufferings and tortures of draft animals were ignored. The losses were neglected. The derision which our muddy roads and thriftless ways excited in Europe failed to make any impression upon our national pride, but when men got a-straddle of a two-wheel vehicle and actually propelled it with their own legs, they discovered that something was radically wrong. By 1892 it was estimated that the number of bicycles in the United States had increased to a million, and the power and influence of their organization, 'The League of American Wheelmen,' became a tremendous national force. As a result of the agitation initiated by them, the office of Public Road Inquiries was established by Congress in 1893 as a division of the Department of Agriculture. Like all other divisions of that very useful department of our Government, its functions have always been purely educational.

Its first line of investigation was in the cost of wagon transportation in both Europe and America. From a comprehensive series of inquiries made in all parts of the United States, it was found that the average cost of hauling a ton one mile upon the common roads of this country was twenty-five cents. Through the report of Consuls in the principal cities of Europe it was found that upon the improved roads there the cost was in the neighborhood of ten cents per ton per mile. In other words, we in the United States were spending two and one-half times as much to haul over our common roads as it cost our European neighbors to haul over theirs.

Roads cost money. The old theory was that each individual community must bear the entire cost of its roads. So long as that prevailed little progress could be made, but it is coming now to be generally understood that the prosperity which follows the building of improved roads is shared by every interest. The city shares with the country in everything that makes for general prosperity or general adversity. We know that nothing stimulates industrial activity so certainly as the building of improved highways. This means better values for real estate, more traffic for the railroads, more demand for manufactured goods, more employment for labor and more money for everybody. Where everyone benefits, everyone should contribute in fair and equitable ratio. The recognition of this principle has led to the establishment of highway commissions in each of the New England and Middle States. New Jersey was the first to try it. After the bitterest opposition and resistance for years, a law was finally passed appropriating a small sum of money from the State Treasury to be expended under the direction of a highway commissioner, whose office was created for the purpose. One of the conditions imposed was that for every dollar of State funds thus expended, the county and the district in which it was spent should contribute certain definite amounts.

The prophets of evil all predicted that the plan would fail; that the counties and districts would not contribute the proportion required by the law to entitle them to any of the State fund. Happily their prophesies were not realized. The plan met the approval of the people. At the next session of the legislature the pressure for a larger appropriation was irresistible. New York and Massachusetts followed along the same lines, and adopted a similar policy. Co-operation has been so satisfactory that the States in which this plan is practiced have increased their appropriations, but have been unable to keep up the growing demands from the communities. Pennsylvania recently appropriated $6,000,000 of State funds to be used in this way. New York State is planning to issue bonds for $50,000,000. Co-operation has proven the key to the situation—the recognition of the fact that all are benefited by improved highways and that all should help to pay for them. During the past two years there has been a very rapidly growing popular demand that the general government should come in as one of the factors contributing. Bills have been introduced into both houses of Congress providing for the appropriation of very considerable sums of money from the national treasury to be apportioned to the States on a basis of their respective populations and to be available when the States themselves appropriate sums corresponding to their respective allotments.

*An abstract from the paper entitled 'Mining Men for Better Roads' read before the Mining Congress, at Portland, Oregon, August, 1904.

As a flux in steel works in America fully 20,000 tons of lump or gravel fluorspar are used annually.

HADFIELD'S MINING MACHINERY.

BY OUR SPECIAL CORRESPONDENT.

For many years Hadfield's patent "Era" manganese steel has been known among machinery manufacturers as about the toughest and hardest material that could be used for the crushing surfaces of mining machinery, and manufacturers in Great Britain and other parts of the world have been in the habit of getting these special parts made for them by Hadfield's Steel Foundry Company, Sheffield. Not only crushing surfaces were obtained in this way, but parts exposed to the abrasion of minerals, such as mine-car wheels, trommels, screens, and conveyors. The firm rapidly obtained a large amount of business of this sort. It soon became obvious that much more efficient work could be done if the complete machines were made on the spot. In this way their design could be more completely adapted to the possibilities offered by the special qualities of the manganese steel. The firm's business was increasing in many ways, so a year or two ago new works were erected at Tinsley in order to provide accommodation for track-work, mining machinery, and other general business, and the accommodation at the old works at Attercliffe was handed over entirely to the department connected with the manufacture of projectiles and war material. The Tinsley works occupy 80 acres, and the foundry itself is 1,100 ft. long and covers six acres.

The firm makes a great variety of screens, trommels, elevators and car-wheels, but it is the crushing machinery which is of chief interest. The crushing machinery at present manufactured consists of gyratory crushers, called the "Heclon," and jaw-breakers, and the design of these shows several novel points.

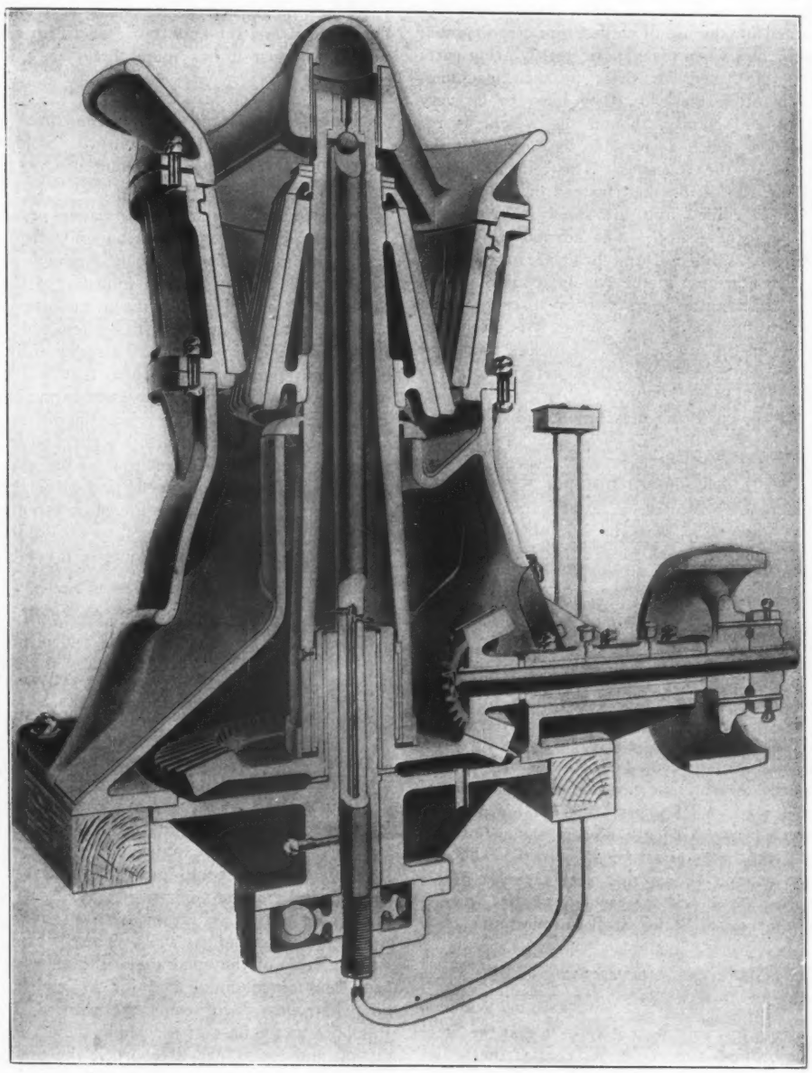
The jaw-breaker has a framework which is cast in solid steel, instead of being made of cast iron, as is usual in this class of machine, so that the weight is reduced by one-half, a consideration when machinery has to be transported any distance. The remainder of the machine is also of ordinary cast steel, with the exception of the jaw-faces, side cheeks, toggles, and toggle-grooves which are of Hadfield's "Era" manganese steel. Usually the jaw-faces of the different makes of breakers are designed to be made in chilled cast iron, with the result that they must be very thick and heavy in order to obtain the requisite strength. When manganese steel is substituted for chilled iron, in the ordinary type of breaker, it is necessary, of course, on account of the design of the breaker, to preserve the same thickness of jaw-face, but owing to the great strength of manganese steel it is possible to make such castings much lighter by coring them out at the back. The difference in the thickness and strength of the two jaw-faces is in this way made very obvious.

The effect of the thick jaw-face castings made of chilled cast iron is that when a comparatively small part of the metal is worn away, the balance must be scraped, thus causing a very serious loss. To overcome this difficulty a special design of jaw-face has been adopted for the solid steel breakers which permits of the maximum quantity of metal being worn away without any risk of breakage, and at the same time leaves only a very small portion of the jaw-face to go to the scrap pile. Also, the reverse side is covered with hard spelter to give a firm backing. With this system of backing it is advisable for the seats which receive the jaw-faces, both in the main frame and in the swing stock, to be carefully machined. While this adds something to the first cost, it ensures perfect fitting of the jaw-faces and rapid work in making the renewals.

The wear on the lower halves of the frame bearings supporting the eccentric shaft, as well as on the upper half of the pitman eccentric bearing, is considerable, and the efficiency of the breaker is largely dependent on keeping these bearings in good condition. Instead of running these journals periodically with anti-friction metal, as is usual, it has been found a great advantage to employ removable brass steps, lined with anti-friction metal, which can be carried in stock and substituted for the worn ones, as occasion demands. This avoids the necessity of dismantling the whole machine during the operation.

The Heclon gyratory crusher is shown herewith in sectional perspective. This machine was illustrated in the JOURNAL in May of last year, but several points have been elaborated since then, and their special features deserve notice. The Heclon differs in design in several ways from the ordinary machine of this type. In the first place the gyratory head is supported from the top, thus diminishing the vibration; and, secondly, the driving machinery and its oiling apparatus are entirely dust-proof; while the use of Hadfield's manganese steel makes it possible to simplify the crushing surfaces.

Instead of using a solid steel central shaft fitting into an eccentric at the bottom, the Heclon machine is built with a hollow shaft fitting over the eccentric, thus preventing all possibility of any dust getting into the eccentric bearing. The hollow shaft also has a number of other advantages. For example, it permits a ball-bearing support at a place where there is practically no motion, thus avoiding the friction incident to supporting a solid shaft on a step at the point of greatest movement. Further, the hollow shaft is much stronger than the solid one, thus making the possibility of a broken shaft in the Heclon breaker a remote contingency.



THE HECLON GYRATORY CRUSHER.

In the gyratory breaker every care must be taken to prevent lost motion, either in the spider at the top, or in the eccentric at the bottom, for if this is not done, the result shows itself immediately in reduced capacity.

It is therefore of importance that some system of renewable parts should be adopted to keep the machine at its maximum efficiency. In the Heclon breaker the bevel wheel and eccentric are made in one piece of cast steel and suitable bushes are provided, which can be kept in stock and readily slipped into place

whenever there is the slightest sign of lost motion, or a fall in the capacity. Extra steel bushes can be put into the spider bearing when required.

The adjustment to regulate the size of the product will be apparent by reference to the illustration, but it should be noted that while the range of adjustment can be considerable in the Heclon breaker, experience has shown that it is not wise to attempt too great a variation in the size of product.

The Heclon breaker is designed specially for the use of wearing surfaces made of Hadfield's "Era" manganese steel. The original gyratory machines of other makes were designed for the use of chilled iron crushing surfaces, and when manganese steel wearing parts are substituted for these in such machines, as is often the case, they have to be very thick and clumsy, though the weight is reduced as much as possible by coring out the backs of the concaves. The crushing cones in the Heclon breaker, instead of being made of solid chilled iron, are simply thin mantles of manganese steel. The advantages of this over the solid cast-iron head are obvious.

The first cost of the two is about the same and the mantle wears two or three times as long as the solid head. When it is ultimately worn out, it can be replaced in less time, and of course there is much less material to go to the scrap heap.

As shown in the illustration, the spider and hopper are cast in one piece. These are made of best toughened cast steel instead of cast iron. In addition to this, the arms of the spiders are protected by "Era" manganese steel cover-pieces, so that the life of both spider and hopper is much longer than would otherwise be the case, and there is not the same necessity for making the hopper and spider separately, as there would be if these parts were of cast iron.

STEEL MAKING CAPACITY.

A statement prepared by the Cleveland *Iron Trade Review* gives the capacity of the steel works of the United States as below, the figures showing the possible yearly output of steel ingots. Of course, the total cannot be realized, as there are always some furnaces and converters under repair. In the table the first column shows the total capacity of all works, the second the capacity of those owned by the United States Steel Corporation:

	Total.	Steel Corp'n.
Bessemer	13,551,000	7,998,000
Open-hearth	11,335,100	2,990,500
Totals	24,886,100	10,988,500

From this statement it appears that the Steel Corporation controls 59 per cent of the bessemer steel-making capacity, but only 26.4 per cent of the open-hearth furnaces. While the total increase in yearly capacity for producing bessemer steel has been 613,000 tons, or 4.7 per cent, in three years, that of the Steel Corporation has been—by construction and purchase—373,000 tons, or 4.8 per cent; that is, about even with the total gain. On the other hand, the total increase in open-hearth furnace capacity has been, in three years, 3,045,350 tons, or 36.7 per cent, the Corporation's increase—chiefly by purchase—was 778,500 tons, or 27.2 per cent, being considerably below the general gain. That is, the Steel Corporation controls now a smaller proportion of the open-hearth steel output than it did when it was first organized, and about the same proportion of the bessemer production as at that time.

BOOKS REVIEWED.

Experiments for Students in General Chemistry. Fifth Edition. By E. F. Smith and H. F. Keller. Philadelphia, 1904: P. Blakiston's Son & Company. Pages, 94; illustrated. Price, 60c.

This little book is intended as a guide for beginners in their laboratory work, and as an aid to instructors. It starts with experiments with apparatus and analyses to show the general nature of chemical reactions, and then takes up the elements beginning with hydrogen and the non-metals. The book is of convenient size, is well printed, has neat little illustrations, and the appearance of a fifth edition shows that it has found favor with instructors.

Mineral Resources and Mineral Industries of Oregon—1903. By O. F. Stafford. Eugene, Ore.: Published by the University of Oregon. Pages, 112; illustrated. Price, 50c.

Owing to the fact that Oregon has no organized geological survey or bureau of statistics, it is exceedingly difficult to obtain reliable information as to the mineral industry of that State, which is rapidly growing in importance. The University of Oregon has attempted to supply the deficiency by issuing a series of bulletins from time to time, a plan that will be commended by everybody interested in mining. The present paper describes briefly the different districts where mineral deposits occur, and sets forth the principal facts relating to the character, development, equipment and ownership of the properties. As it is the most comprehensive and recent contribution to the subject that has appeared, it will no doubt be favorably received.

Geologic Atlas of the United States. Latrobe Folio. Washington: Engraved and printed by the Geological Survey. Maps and 15 pages text.

The Latrobe quadrangle is in the Conemaugh valley, Pennsylvania, diagonally between the areas covered by the Indiana and the Brownsville-Connellsville folios. It embraces parts of Indiana and Westmoreland counties, the most important town in the quadrangle being Latrobe. The rocks exposed, all of Carboniferous age, are bent into low, broad folds, and have a total thickness of about 2,250 ft. The underlying Devonian strata have been well prospected by oil and gas wells. The chief mineral resource of the quadrangle is coal, which has been mined and coked for a long time near Latrobe. Two seams are worked, the Pittsburg at the base of the Monongahela formation and the Upper Freeport at the top of the Allegheny formation. There are three isolated areas underlaid by the Pittsburg seam in the quadrangle, the bulk of the Pittsburg coal lying to the southwest. The Latrobe syncline, the most important area, is the northeast end of what is known as the Connellsville basin, and the Pittsburg seam, 4 to 8 ft. thick, is mined at Klondike, Baggaley, Hostetter, Latrobe and other points. This famous seam is far from being exhausted, but no great increase in output can be expected, and operators are seeking coal in the underlying formations. The Upper Freeport is the most promising seam. This seam runs from 4 to 6 ft. thick over most of the quadrangle, and large mines to work it are being opened near Tunnelton. The coal must be washed to make furnace coke. No coke is now made from it in the quadrangle.

BOOKS RECEIVED.

In sending books for notices will publishers, for their own sake and for that of book buyers, give the retail price? These notices do not supersede review in a subsequent issue of this JOURNAL.

Annuaire Statistique de la Belgique, 1903. Brussels, Belgium: National Printing Office. Pages, 439.

The Architects' and Builders' Pocket-Book. By Frank E. Kidder. New York: John Wiley & Sons. London: Chapman & Hall. Pages, 1656; illustrated. Price, in morocco, $5.

Statistiche Zusammenstellungen über Blei, Kupfer, Zink, Zinn, Silber, Nickel, Aluminum, und Quecksilber von der Mettallgesellschaft und der Metallurgischen Gesellschaft A. G. .Frankfort-on-Main, Germanys Metallgesellschaft. Pages, 67.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

Volumetric Determination of Zinc.

The Editor:.

Sir—In my article published on pp. 298-299 of this JOURNAL for August 25 occurs a reference to the above method. Mr. Skinner has called attention to an error in the original description of the method, namely, the printing twice of the boiling point of the zinc chloride solution as 180° instead of 108° C. Analysts who have to make accurate arsenic determinations will do well to consult also the earlier paper by Allan Gibb on the evolution of the distillation methods for arsenic and antimony in the *Journal* of the Society of Chemical Industry for March 30, 1901, pp. 184-188.

W. GEO. WARING.

Webb City, Mo., Sept. 13, 1904.

SAULT STE. MARIE CANAL TRAFFIC.

Sault Ste. Marie canal traffic up to September 1 this year shows a loss in total freight compared with the total for the corresponding period last year, though the movement in July and August this year has been heavy. The loss is due to the late opening of navigation and the strike of the masters and pilots. This year east-bound freight to September 1 was 10,576,709 tons; west bound, 4,266,266; tons; total, 14,842,975 tons. This compares with a total of 22,628,170 tons in the corresponding period of 1903. The total number of vessels passing through the canal to September 1 this year was 8,083, having an average capacity of 1,354 tons.

The figures of mineral traffic to September 1, this season and last, compare as follows, the figures being net tons, except for salt:

	1903.	1904.	Changes.
Anthracite	645,894	518,574 D.	127,320
Bituminous	3,976,210	2,355,166 D.	1,621,044
Total coal	4,621,104	3,073,740 D.	1,748,364
Iron ore	14,980,989	8,696,180 D.	6,284,809
Pig and manuf. iron	97,532	91,094 D.	6,438
Copper	59,269	48,847 D.	10,422
Silver ore	.....	1,313 I.	1,313
Building stone	8,440	14,234 I.	5,784
Salt, bbl.	255,253	248,837 D.	6,416

Considering the late opening of navigation this year and the short supplies at the head of the lakes in the spring of 1903, the movement of coal has been remarkably heavy.

ABSTRACTS OF OFFICIAL REPORTS.

American Smelting and Refining Co.

The report of the American Smelting & Refining Company for the fiscal year ending June 30, 1904, the fifth of its existence, shows that the affairs of the company are in a prosperous condition. The gross earnings during the year amounted to $9,425,443, an increase of $21,732 over those for the previous 12 months. Deducting sums needed for repairs, betterments, interest, taxes and general expenses, there remained net earnings of $7,905,573, being an increase of $328,787 as compared with the previous year. Out of the net earnings, $91,254 was set aside for the employees' profit-sharing fund, and $1,097,582 was appropriated for new construction, improvements and metal stock account. The net income balance thus amounted to $6,716,737, an increase of $1,295,634 for the year. The balance sheet for April 30, 1903, was as follows:

Property	$86,845,670.51
Investments	1,680,305.92
Metal stocks	17,032,300.19
Material	1,224,687.80
Cash	4,047,423.38
Total assets	$110,830,387.80
Capital stock	100,000,000.00
Bonds	920,000.00
Net current liabilities	638,610.12
Unearned treatment charges	2,431,969.45
Undivided surplus	6,839,808.23
Total liabilities	$110,830,387.80

Following the practice of the past few years, the executive committee has appropriated $1,097,581.75 from the earnings of the year for the following purposes—$597,581.75 covering expenditures for new construction and for extraordinary improvements, and $500,000 carried to the credit of the metal stock account. The executive committee thought it wise, in view of the large increase in surplus account, to further decrease the book value of metals in process of treatment, thus giving an additional reserve to absorb possible fluctuations in market quotations.

Preferred stock dividends, No. 16 to 19, inclusive, aggregating $3,500,000 were declared and paid quarterly during the year, and beginning with the quarter ending October 31, 1903, dividends have been paid of one and one-quarter per cent quarterly on the common stock, aggregating $1,250,000, leaving the surplus for this year $1,966,737.20, which has been carried to the income account, making the undivided surplus $6,839,808.23.

The income account compares with the previous year as follows:

	1903.	1904.	Changes
Earnings	$9,403,711	$9,425,443 I.	$21,732
Repairs and betterments	$770,854	$818,141 I.	$47,287
Int., taxes and gen. exp.	1,056,071	701,729 D.	354,342
Employees' profit sharing fund	.....	91,254 I.	91,254
Extraordinary improvements and metal stock account	2,155,683	1,097,582 D.	1,058,101
Total charges	$3,982,608	$2,708,706 D.	$1,267,902
Net balance	$5,421,103	$6,716,737 I.	$1,295,634
Dividends pf. stock	3,500,000	3,500,000	.....
Dividends com. stock	.....	1,250,000 I.	1,250,000
Surplus	$1,921,103	$1,966,737 I.	$45,634
Surplus from prev. year	2,951,968	4,873,071 I.	1,921,103
Total surplus	$4,873,071	$6,839,808 I.	$1,966,737

The physical condition of the property of the company has had the constant attention of the management, with the result that the former excellent condition has been maintained and improved in many particulars. At most of the plants the costs of operation have been reduced by means of the extraordinary improvements instituted.

It will be noted by the balance sheet that no addition has been made to the property account during the year, the cost of new construction having been covered by appropriation from the year's earnings.

As opportunity has offered the company has retired bonds issued by the Omaha & Grant Smelting Company, maturing in 1911, and the total of such bonds outstanding April 30, 1904, was $729,000.00. Under the terms of the six per cent bonds issued by the Pueblo Smelting & Refining Company, $191,000.00 of which were outstanding at the close of the year, the company had the option of paying the same on July 1, 1904. Although not due until 1913, the directors have thought it wise to cancel this obligation.

The net current liabilities of the company, as shown on the balance sheet, represent accounts payable not yet due, less accounts in process of collection.

Many important contracts for material for the company's smelting and refining plants have been made, and the executive committee has sought by the execution of such contracts to establish the operations of the several plants upon a sure foundation covering many years.

There has been entire harmony and intelligent co-operation between officers and employees during the year, which has resulted in increased efficiency and a decrease in general expense and cost of operation. In accordance with the desire of the directors to properly reward such efficient services as the company has enjoyed, a distribution of the sum of $91,253.89 has been made out of the year's profits to employees holding positions affecting operations and earnings, and with this distribution has gone the most hearty acknowledgment of appreciation on the part of the board.

A further investment in the stock of the United States Zinc Company has been made during the past year. The production of zinc ores in the State of Colorado has increased very largely during the last few years. These ores to a considerable extent have been shipped to Germany to be smelted. The works of the zinc company, at Pueblo, Colorado, which have been erected for the purpose of smelting such ores at a point convenient to that of their production, have only been completed during the past year, but are already being operated at a profit.

The directors have felt it wise also to invest some of the surplus earnings of the company in the stock of lead manufacturing companies utilizing, as raw material, the pig lead produced by this company.

The transporting, via steamers, of ore and bullion from Mexico and South America to the works of the company at Perth Amboy, and of coal, coke and other supplies from this country to the smelting works of the company in Mexico, was deemed by the directors a business of sufficient magnitude to warrant the chartering of steamers for this purpose. The American Smelters' Steamship Company has therefore been organized, the stock of which is entirely owned by this company. The rates of freight charged have been the lowest rates made by any of the established lines, and with this allowance the steamship company has shown a profit of $93,004.50 during the past year. The map on the following page exhibits the distribution of the plants belonging to this company and its associates.

Consolidated Mercur Gold Mines Company.

This company operates an extensive low-grade property in the Mercur district in Utah. The report covers the year ending June 30, 1904. During that period the ore mined and treated in the mill was 226,701 tons. The financial statement for the year may be given as follows:

	Amount.	Per ton.
Gold produced	$648,516	$2.86
Rents, etc	8,433	0.04
Unappropriated balance from previous year	5,966	0.02
Total receipts	$662,915	$2.92
Mine expenses	$317,651	$1.40
Mill expenses	362,069	1.60
Total expenses	$679,720	$3.00
Deficit	$16,805	$0.08

The surplus from the previous year was $123,243; deducting the deficit above, a balance was left of $106,438. Payments for repairs on Manning mill were $1,718; slime plant construction, $55,200; total construction expenses, $56,918, leaving a balance of $49,520. Of this, $42,972 is in supplies, the balance in cash and cash assets.

The average recovery for the year was $2.86 per ton. The assay value of the tailings varied very much; the lowest was $0.83 in July, 1903, and the highest $1.43, in April, 1904. The average for the year was $1.03 per ton, making the total value of the ore $3.89 per ton. The manager's report says that the value of the ore, which was in sight a year ago, proved to be below the estimates made. Work in prospecting and blocking out ore has been carried on steadily, and recent discoveries have been encouraging. The boundaries of the known orebody have been extended, and there has been some improvement in grade.

The ore milled showed a decrease of 119,658 tons, as compared with the previous year. The reduction was largely due to the fact that eight out of the 26 leaching vats in the mill were used for the slime plant equipment. At one time the daily treatment of ore was below 500 tons, though in the first half of the year it was 750 tons. The present average is 600 tons per day.

Concerning the slime plant, the report says:

"On May 11, 1903, stockholders were advised, by circular letter, that owing to the high tailings we had been having, the company had decided to install the Moore slime process, for the purpose of bettering our extraction. In last year's annual report it was stated that construction was well under way, but that it had proven to be a bigger piece of work than was first thought. Subsequent developments showed that even then we had not the remotest idea of the difficulties before us. Before we decided to install the process, the inventor, Mr. Moore, assured us that he had fully worked out all of the details of the process, and had it ready for practical operation. He had already spent several months at our mill, developing his machinery, as well as conducting a series of experiments, to find out what results could be obtained on Consolidated Mercur ore, and to determine the best method of working it. From these tests he reached the conclusion that by the use of his process the tailings could be reduced to 50c. per ton. He designed a plant, to be installed in the leaching department of our mill, and figured that the installation would effect such economies in other quarters that there would be little or no increase in our operating expenses. He estimated that the proposed plant could be built in three months, and at a cost which the board of

directors considered very reasonable. Upon this representation, the directors decided to adopt the process, thinking at a modest cost to increase the company's earning capacity very materially, and to make it possible to treat at a profit ore which had previously been too low grade to pay. A mechanical engineeer, whose ability we had no reason to question, was engaged to investigate the mechanical features of the proposed installation, and to prepare detailed plans and specifications. He reported favorably on the proposed construction, and his estimates as to the cost and time of getting the process ready to run corroborated Mr. Moore's figures in every particular. We accordingly felt sure of our ground, and went to work to build the plant as it had been designed.

"It would be futile to attempt to describe all the obstacles we encountered while we worked on the slime plant. Suffice it to say that up to date our slime plant construction account amounts to $59,521, and the plant is not now in operation. This looks on the face of it like a flat failure of the Moore process, but as a matter of fact, such does not appear to be the case. The merits of the process are by no means disproven by our experience. Indeed, the operations in our mill indicate that our confidence in the process was not misplaced. Our unhappy results are to be accounted for by the following two reasons: First—Mr. Moore was mistaken when he believed that he had the process sufficiently developed to install it on a working scale. This became apparent as soon as we attempted to operate the plant, and we had to spend a great deal of time and money trying, in our big plant, to work out points which should and could have been fully and finally determined in a small testing plant. A few months more of experimenting on the part of Mr. Moore would doubtless have saved us many thousand of dollars, and would have enabled us to build a successful plant. Second—The plant as designed and now installed, contained numerous serious mechanical defects. Indeed, practically all of our troubles with the slime plant were mechanical. Had the machinery and appliances been correctly designed, so as to meet the peculiar conditions they were intended for, and so as to do their work properly, no doubt the plant would now be running and performing all that was predicted for it. The extraction of values was generally quite satisfactory, but it proved to be a physical impossibility to keep the plant running in its present condition. To be sure, this was the first time the Moore process had ever been constructed on a working scale, and perhaps it is not wholly surprising that it should have contained crudities and imperfections. At the same time, it is undeniable that a good many of the violations of mechanical principles should have been detected by the engineer, when he worked over the plans. We have found no reason to discredit the Moore process itself, but our particular application thereof has so far been practically a failure, simply because of engineering mistakes. The evil effects of these errors did not end with their discovery. Lured on by the low tailings obtained, we attempted to make the best of the work already done, and invested more money and time endeavoring to perfect the faulty plant we had installed. In the end, however, we were forced to close down the plant, firmly convinced that it contains such grave mechanical defects, that to improve it and make it a success would be equivalent to building a new plant.

"The slime plant was closed down on May 26, and has remained idle ever since. Owing to the low tailings now being obtained by the old method, no thought has been given to further work on it. Whether it will be taken up again will depend on future developments."

PLANTS OF THE AMERICAN SMELTING AND REFINING COMPANY AND ASSOCIATED COMPANIES.

QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc. Preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Monazite.—What were the exports from Brazil last year, and has there been any extension in mining? A. J.

Answer.—The British consul at Bahia states that the exports of monazite sand from that port in 1903 were 1,834 long tons, valued at $232,345. Concessions have been granted for mining in the State of Espirito Santo, where the deposits are said to be extensive.

Bismuth Ore.—Will you kindly give me some information in regard to the value of bismuth ores and the smelters in this country? I have recently found a deposit of rich ore and desire to know where I can dispose of it to best advantage. N. P.

Answer.—You will find the information you desire in the issue of this JOURNAL for Sept. 1, 1904. There are no smelters of bismuth ore in this country, and the trade in the metal is controlled by two producers—Johnson, Matthey & Co., Ltd., of London, England, and the Saxon government. The usual prices for bismuth ore range from $8 to $11 per unit, with an allowance for gold and silver.

Chrome Ore.—Will you kindly inform me whether the price quoted for 50 per cent chrome ore at New York, as given in a recent issue of your JOURNAL, includes the freight, or is it customary for the buyer to pay this? Is there a strong market for the best grade of chrome ore, and what is its value at the mines, generally speaking? S. C.

Answer.—No, it is not the usual thing for a seller to itemize the total cost of chrome ore or any other product that is quoted at New York, for obvious reasons. When the price is ex-ship, New York, it represents cost, insurance, freight, etc. In a few instances, however, a large consumer finds it more advantageous to contract f.o.b. mine, anticipating a saving in the cost of delivery. Just at present keen competition in the chrome ore trade has made it expedient for certain large consumers, notably chemical manufacturers, to place orders for supplies some time ahead at a price delivered at their works. These contracts are understood to have been booked at $18@$19 per long ton for 50 per cent foreign ore, delivered at Atlantic ports. Considering that much the greater part of our consumption of 40,000 tons or so per annum is imported free of duty, chiefly from Turkey and New Caledonia, at comparatively low prices, it would be inadvisable for mines in the Western States, with high rail freights, to try to compete in Eastern markets. To emphasize this fact it need only be said that the combined cost of mining, treatment and transportation of California chrome ore to Eastern chemical works is greater than the cost of ore abroad, plus the ocean freight to the Atlantic seaboard. Until the consumption, both in the chemical and steel industries, grows to still larger proportions, it would seem inexpedient to develop a mine with ore analyzing less than 50 per cent chromium sesqui-oxide that must be hauled a long distance by rail.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

EVIDENCE AS TO DIFFERENCE IN RESULTS BEFORE AND AFTER REPAIRS ADMISSIBLE.—In a suit to recover the balance of the price of a mining concentrating mill, evidence of the amount of lead and jack turned in from the mine operated by the plant after it had been reconstructed is admissible as tending to show the capacity of such plant after reconstruction, where it was contended that the reconstruction had been improperly done.—Chowning v. Parker (78 *Southwestern Reporter*, 677); Appellate Court of Missouri.

RIGHTS AND PRIVILEGES AS TO BLOWING OFF GAS WELLS.—Persons using horses on a highway in close proximity to a gas well have the right to presume that the owner will not open it without warning, and are not guilty of contributory negligence in failing to turn and fly from it, or in failing to give warning of their presence. The owner of such well, however, can open and allow the gas to blow the water out of it, though the noise is such as to frighten horses or persons on the highway.—Snyder v. Philadelphia Co. (46 *Southeastern Reporter*, 366); Supreme Court, West Virginia.

WHEN FACTS ARE UNDISPUTED IT IS DUTY OF JUDGE TO INSTRUCT JURY.—One who enters on the premises of another (such as mining property) as a servant to the proprietor, to perform labor for him, is not a trespasser, as he is deemed to be upon such premises by invitation of the owner, who owes him the duty of keeping such premises in a reasonably safe condition. Where the facts are undisputed, and such that all reasonable minds must draw the same conclusion from them, it is the duty of the judge to say whether, as a matter of law, they make up a case of actionable negligence.—Williams v. Belmont Coal & Coke Co. (46 *Southeastern Reporter*, 802); Supreme Court, West Virginia.

MEASURE OF DAMAGES ON BREACH OF CONTRACT WHEN PARTY CANNOT GET IT ELSEWHERE.—In an action for breach of contract for sale of the output of a coal mine, evidence that the entire output of the region producing coal of the character of that contracted for had been bought up by others, and that B's was the last one the output of which could be purchased, was admissible to show whether A, on B's breach of contract, could provide himself with coal in the same market, and charge the excess in price, if any, to the seller. When he could not get other coal he was entitled to recover the difference between the price at which he had contracted to buy the coal and what he was to receive from the party to whom he had resold it.—Wilmoth v. Hamilton (127 *Federal Reporter*, 48); United States Circuit Court of Appeals (Pa.).

CLAIMANT MUST ESTABLISH BY CLEAR EVIDENCE THAT VEINS ARE KNOWN.—Mere outcroppings or other indications of a vein within the limits of a placer, or evidence of the existence of a vein which might be sufficient to support a lode location as against a conflicting lode claim, or as against a subsequent placer location, in an adverse proceeding, are not sufficient to establish the existence of a known vein or lode within the boundaries of a placer, prior in point of time, and which has been patented. The burden of proof is on a claimant of a lode located within the limits of a prior placer patent to establish by clear and convincing testimony that the veins which he claims as existing by operation of law from placer application are of a character which will render them known veins.—McConaghy v. Doyle (75 *Pacific Reporter*, 419); Supreme Court of Colorado.

AMOUNT PAID FOR ASSESSMENT WORK NOT CONCLUSIVE, BUT EVIDENCE OF GOOD FAITH OF CLAIMANT.—On an issue as to performance of annual assessment work on certain mining claims for the year 1901, it appeared that the property was in litigation between the parties in that year in another State; that a receiver was appointed, and that an order was made authorizing him to borrow $1,500 for the purpose of preserving the property and performing the assessment work for that year; that the money was obtained and expended for that purpose, the receiver's report presented to court showing the performance of the work according to law, and an order made approving such report. This was held to be a sufficient prima facie showing that the work had been performed, as the burden of proof is on the one contesting the claim that the work has been done, and evidence of the amount paid, though not conclusive, is admissible as bearing on the claimant's good faith.—Whalen Consolidated Copper Mining Co. v. Whalen (127 *Federal Reporter*, 611); United States Circuit Court (Nevada).

PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ending September 13, 1904.

769,689. RABBLE FOR ROASTING FURNACES.—Michael Corcoran, Anaconda, Mont. This device consists of an arm provided at its lower edge with lateral base-flanges, a carrier-plate with flanges arranged to engage the base flanges of the arm whereby the carrier-plate may be slid upon the arm, and a blade, the blade and carrier-plate being provided one with a guide and the other with a head adapted to engage the guide whereby the blade may be slid into position in the carrier-plate.

769,709. TUBE ROLLING MILL.—John H. Nicholson, Pittsburg, Pa., assignor, by mesne assignments, to National Tube Company, a Corporation of New Jersey. In a tube-rolling mill, a mandrel-bar, a plurality of supports for the mandrel-bar located intermediate its ends and spaced away from each other each of the supports having an aperture adapted to pass the mandrel-bar and a tube rolled thereon, and means within the supports normally engaging the mandrel-bar and movable out of the aperture and through the aperture in the adjacent support by the thrust of the tube thereagainst.

769,712. TILTING METALLURGICAL FURNACE.—John A. Potter, Pittsburg, Pa. An endwise tilting furnace, movable regenerators located at opposite ends of the furnace and having ports arranged to register with its end ports and arranged with a space below one end of the furnace to admit a receptacle and means for tilting the furnace below the ports to pour at least a part of the bath from the end port of the furnace into the receptacle.

769,727. WELL-SINKING APPARATUS.—Matthew T. Chapman, Aurora, Ill. The combination with a rotatable platform of a pair of jaws mounted thereon, each jaw comprising an endless chain, and a support therefor consisting of a block having a groove in its face, in which groove said chain is adapted to move.

769,742. CEMENT KILN.—Frank M. Haldeman, Alpena, Mich. A cement-kiln having a hood removably attached thereto, said hood and kiln being each provide with a lining of fire-brick or similar material, and a gasket of asbestos or similar non-heat-conducting and non-fusible material between said linings.

769,771. BRICK-MOLD.—Edward W. Seamans, Grand Rapids, Mich. The combination of a sill, partitions rigidly attached thereto, a bed-plate having slots to receive the partitions, detached side-bars to engage the respective ends of the partitions, and stops attached to the bed-plate and extending vertically across the side-bars whereby the said stops serve as the sole means of retaining the side bars in place.

769,806. BUNSEN BURNER.—Theodore Smith, Chicago, Ill. The combination with a pipe, of a centrally perforated plate having a downwardly-extending lug screwed upon the end of said pipe to close the same, and support the plate, a tube threaded in the perforation in the plate, and in line with the perforations in the pipe, an internally-screw-threaded plug screwed into one of the perforations, and a pointed screw, threaded in said plug-screw and adapted to be screwed into or out of the other of said perforations in the pipe.

769,819. PRESS FOR MOLDING BUILDING BLOCKS.—Gilbert H. Denton, Denver, Colo., assignor to John Albert Ferguson, Denver, Colo. The combination with a base, of the threaded guide-rods secured thereto, a platform slidably mounted on the guide-rods, an adjustable frame carried by said rods and arranged above the movable platform, adjusting nuts provided with peripheral teeth rotatably mounted on said frame and engaging the threaded ends of the guide-rods, a sprocket-chain engaging the teeth on said adjusting-nuts, and means for reciprocating the platform.

769,828. EXCAVATING APPARATUS.—Thomas F. Moore. Syracuse, N. Y. An excavator having its sides of greatest depth substantially midway between their ends and a bottom extending from the rear ends forwardly along the lower edges of the sides and terminating at substantially their lowest points.

769,860. PROCESS OF PURIFYING GAS.—Willard O. Felt, New York, N. Y. Subjecting the gas to the action of glycerine.

769,886. GOLD-SAVING APPARATUS.—James S. Bollinger, Cherokee, Cal., assignor of one-half to John A. Clark, Yankee Hill, Cal. The combination with a riffled or like surface of an arrester for the undercurrent of water flowing thereover, comprising a series of successively-arranged flexible screen-sections secured at their upper ends to said surface and approximately of the same width as said surface.

769,902. HOISTING APPARATUS.—Charles W. Hunt, New York, N. Y. The combination of two drums loosely mounted, an equalizing-gear in operative relation with both drums, means to apply power to the equalizing-gear, a boom, guide-sheaves, a boom-truck, a running-block, multiple sheaves on the boom-truck and the hook-block and ropes passed over said guide-sheaves and said multiple sheaves.

769,903; 769,904. HOISTING APPARATUS.—Charles W. Hunt, New York, N. Y. The combination of two drums loosely mounted, an equalizing-gear in operative relation with both drums, means to apply power to the equalizing gear, and an independent motor operable independently of said means to apply power to one of said drums.

769,911. HAULAGE SYSTEM.—Horatio S. Moore, Monongahela, Pa., assignor of one-half to Thomas M. Evans, McKeesport, Pa. A car having a gripping device, a cam device in the track arranged to automatically unlock the grip and connections for throwing the cam device into or out of operative position.

769,938. PROCESS FOR EXTRACTING PRECIOUS METALS FROM ORES OR SLIMES.—Henry R. Cassel, New York, N.Y. The process consists in adding a bromide and cyanide in solution to the ore, and then passing chlorine gas through the mixture.

769,974. PULVERULENT - FUEL - BURNING APPARATUS.—Wiltsie F. Wolfe, New York, N. Y., assignor to Peter B. Bradley, Boston, Mass. The combination with a pulverulent-fuel-feed device of a primary retort-like combustion-chamber having a path through which substantially all the products of combustion pass, leading therefrom, having a fuel-deposit receiver out of but adjacent to said path to receive the unconsumed fuel particles passing from said combustion-chamber, a deflecting-wall beyond said receiver to deflect therein such unconsumed particles and means to supply air to said receiver to promote the combustion of the unconsumed fuel particles therein.

770,015. CONVEYOR-ROLLERS.—Frank N. Merrill, Belgium. The combination of a stand having a tubular journal which is open at one end and has a lateral opening or passage through it, a roller having a closed web and a hub fitted to turn on said journal, said web forming with the rim of the roller a lubricant-receptacle which communicates with one end of the bore of said journal, and a removal cap or closure for said receptacle.

770,025. FURNACE.—Theodore G. Selleck, Chicago, Ill., assignor to Acme Steel Company, Chicago, Ill., a corporation of Illinois. A furnace provided with a treating-box openingt hrough one wall of the furnace a combustion chamber arranged directly under one end of the treating-box and flues so arranged as to conduct the flames from the combustion-chamber forwardly under the treating-box, thence upwardly around the box adjacent to its forward end, and thence backwardly and across the top and along the sides of the box.

770,046. EXPLOSIVE.—Hans von Dahmen, Vienna, Austria-Hungary, assignor to Firma G. Roth, Vienna, Austria-Hungary. An explosive consisting of ammonium nitrate, aluminum, and a nitrohydrocarbon.

770,047. EXPLOSIVE.—Hans von Dahmen, Vienna, Austria-Hungary, assignor to Firma G. Roth, Vienna, Austria-Hungary. The process of treating ammonium nitrate explosives containing a component whose fusing-point is below the temperature of decomposition of ammonium nitrate, consisting in compressing the finely-divided, intimately-mixed components, heating the so-compressed mass, immersing it in a bath of the fusible component in a state of fusion, and finally allowing the mass to cool.

770,077. OIL-FEEDER.—John W. Kirshman, California, Mo. An oil-feeder comprising a suitable oil-receptacle having an oil-outlet; a pump-casing below the oil-receptacle; a pump-plunger in said casing and packed at both ends; the oil-receptacle communicating with the plunger at a point between its ends, and there being an air-passage through the plunger to the oil receptacle; and check-valves controlling said air passage.

770,083. COMPOSITION OF MATTER.—Eugene C. May, Chicago, Ill. As a new article of manufacture, a pressed brick tiling or like article, consisting of a mixture of pulverized ashes, powdered silica, a binding material, and a coating of carborundum, calcium chloride and sodium silicate.

770,111. APPARATUS FOR CHARGING BLAST FURNACES.—Walter R. Reece, Pittsburg, Pa., assignor, by mesne assignments, to Clarence W. Coffman, Pittsburg, Pa. This apparatus comprises a casing having curved walls and two axially-mounted valves movable toward each other, each valve fitting against the said curved walls and having a plurality of pockets, opposite coinciding portions of the two valves forming the bottoms of coinciding pockets, a bell beneath said valves, and an actuating-rod therefor, said valves being designed to discharge against the apex of said bell.

770,137. MANUFACTURE OF PAVING OR ROOFING COMPOSITION.—Henry F. Williams, San Francisco, Cal. The process of treating bituminous sandrock consists in softening said rock and then mixing with it lime-sludge produced in the manufacture of beet-sugar whereby the said rock is hardened and toughened.

770,151. COKE OVEN.—Theodor Bauer, Berlin, Germany. In a battery of adjacent coke-ovens, the combination with a plurality of vertical narrow ovens, of a plurality of vertical heating chambers, two on both sides of each vertical narrow oven, each divided by partitions into a plurality of groups of vertical flues, a plurality of vertical air-heating chambers, one between two adjacent heating-chambers and one on the side of the external heating-chambers of the end ovens, each divided by partitions into a plurality of groups of vertical channels which communicate with the atmosphere by means of adjustable openings and with the flues of the adjacent vertical heating-chambers by holes located alternately at the top and at the bottom for the several groups, three main mixing-channels placed in the longitudinal direction of the battery above the vertical narrow ovens and the vertical heating-chambers and communicating therewith, means for closing and opening the three main mixing-channels to the vertical narrow ovens and the vertical heating-chambers, means for arbitrarily exhausting the gases from the vertical narrow ovens, a condensing apparatus for purifying the exhausted gases, three tubes with branches for conducting a part of the purified gases from the condensing apparatus to the three main mixing-channels, a steam source, means for injecting the purified gases from the branches of the three tubes by means of steam from the steam source into the three main mixing-channels, a plurality of horizontal heating-flues, one beneath each vertical narrow oven and divided by one partition into halves which communicate with the last flues of the adjacent vertical heating chambers by slots, a plurality of horizontal cooling-channels, one beneath each horizontal heating-flue and divided by partitions into several parts which communicate by holes with one adjacent vertical air-heating chamber for preliminarily heating the air, two main collecting-flues placed along the two longitudinal battery sides and leading to boilers or the like and to a chimney, a plurality of descending flues connecting the horizontal heating-flues with the main collecting-flues, means for opening and closing the descending flues, a plurality of communicating channels connecting the three main mixing-channels with each other, a plurality of descending channels connecting the communicating channels with the two main collecting-flues, and means for regulating the escape of any excess of gases or mixture from the three main mixing-channels to the two main collecting-flues.

770,155. CONVEYOR.—Henry H. Bighouse, Canton, Ohio, assignor to the Aultman Company, Canton, Ohio, a corporation of Ohio. The combination of a delivering-conveyor, a receiving-conveyor running at an angle thereto and a side guide along the delivering-conveyor extending above its surface, which guide is terminated or partly removed at a point remote from the receiving-conveyor to permit the articles conveyed to extend at an angle to both of said conveyors, whereby the forward end of such article is conveyed in one direction by the receiving-conveyor while the rear end of such article is conveyed in another direction by the delivering conveyor.

770,214. PROCESS OF PRODUCING HYDROGEN CARBIDE.—Henry S. Blackmore, Mount Vernon, N. Y. The process consists in exposing a metallic carbide containing at least 9% carbon to the action of a sulpho-hydrocarbon the sulphur content of which has greater affinity for the base of the carbide than it has for the hydrocarbon radical with which it is combined.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy.

Week Ending August 27, 1904.

4,975 of 1904. TREATING IRON SANDS.—M. Moore and T. J. Heskett, Melbourne, Australia. Process consists of acting on the fine sands by carbonic oxide and passing the reduced iron into a gas furnace to be melted.

11,629 of 1904. MINE CAGE.—P. Thielmann and J. Meisenberg, Duisburg, Germany. A mine cage with movable platform to facilitate the discharge of the wagons.

12,359 of 1904. HOIST.—J. Roberts, Whitehaven. Machinery for raising rock from bore holes and from flooded mines.

12,976 of 1904. ROASTING FURNACE. J. M. Cutler, Ukiah, California, U. S. A. An improved continuously acting roasting furnace for quicksilver ores using petroleum as fuel.

13,818 of 1904. CONVEYOR BELT BRUSH.—C. K. Baldwin, New York. A rotary brush for cleaning conveyor belts.

14,321 and 14,322 of 1904. MINERS' SAFETY LAMP. J. Prestwich, Manchester. Improvements in miners safety lamps, particularly for preventing the irregular opening of them.

Week Ending September 13, 1904.

17,272 of 1903. ELECTRIC BATTERY.—T. Grainger, Newcastle-on-Tyne. Improved electric battery for firing blasting charges.

19,505 of 1903. MAKING ANTIMONY OXYSULPHIDE.—Societa d'Antimonio, Genoa, Italy. Producing oxysulphide of antimony, by heating the sulphide with an excess of fuel and with a limited supply of oxygen.

21,183 of 1903. BRIQUETTE FURNACE ATTACHMENT.—W. Simpkin, London. Improved arrangement of the heating apparatus for furnaces used in baking briquettes of ore.

21,299 of 1903. STEEL TREATMENT.—C. C. Garrard, Hollmwood. Electrolytic method of removing scale from forged steel.

21,981 of 1903. BRIQUETTE MACHINE.—W. Simpkin, London. A machine for briquetting ores, the chief improvement being in the way the rotating cylinders are held apart.

22,045 of 1903. ROCK DRILL.—A. Fauck, Galicia, Austria. In percussive rock drills actuated by springs, holding the back end of the drill by a wire which passes around an eccentric, the speed of which may be made so great as to obtain 2,000 blows per minute.

9,468 of 1904. ELECTRIC SMELTING FURNACE.—A. Neuburger and A. Minet, Berlin. In electric smelting furnaces, heating the charge preliminarily in passages round the furnace, thus more efficiently utilizing the heat produced by the electric current.

SPECIAL CORRESPONDENCE

San Francisco. Sept. 14.

(From Our Special Correspondent.)

Some recent transfers of placer mining ground in the Spanish creek basin in the southeastern part of Plumas county, between the north and middle forks of the Feather river, serve to call renewed attention to the revival of interest in the auriferous gravels of various districts along the western slope of the Sierras, which were the main gold fields of early days. The transfers are from H. H. Yard, of San Francisco, to W. P. Hammon, of Oroville, and comprise a half interest in placer claims aggregating nearly 14,000 acres, and a five-sixths interest in other claims amounting to 3,300 acres. The 110 placer claims involved lie in seven adjoining townships, and include ancient channels, bench deposits and the beds and banks of present streams, presenting a great variety of topographical and other conditions. Most of this mining ground not patented has laid idle for a generation, but about three years ago there began a marked but quiet activity on the part of a few people in acquiring such ground in the lower watershed of the Feather in eastern Butte county and in western Plumas county. Mr. Yard and associates have been securing many thousands of acres of timber and mineral land in Plumas county, with a view to its exploitation when transportation facilities are bestowed on a hitherto remote region, rich in undeveloped resources. Mr. W. P. Hammon also has been acquiring placer mining ground in the general region described, which reaches 50 miles or more from the Sacramento valley floor at Oroville along the forks of the Feather up the lower slope of the range. Authorities familiar with this field estimate the holdings of auriferous gravels so acquired within three years at 160,000 acres, and that $150,000 a year is being spent in locating and prospecting.

Officials of the Mountain Copper Co. deny that there is any foundation for the recent reports that they contemplate erecting a smelting plant on San Francisco bay where the company has recently acquired holdings. The smelting plant will continue to be operated at Keswick, Shasta county. The company has bought the plant of the San Francisco Chemical Co. at Fleming's Point, West Berkeley. It proposes to erect a roasting furnace of about 30 tons capacity, handling some of the company's own ores, the cinders to be returned to the Keswick plant. Beyond changes in the plant recently noted, the company will otherwise operate by its usual scale and method.

Forest fires of unusual severity have occurred in several districts of the State during the past two or three weeks, particularly in the coast ranges north and south of San Francisco. Several minor quicksilver properties suffered in Sonoma county from a fire that swept a considerable district about Pine flat and Big Sulphur creek. The severest loss was sustained by the Sonoma Consolidated Quicksilver Co., which last year built a $15,000 smelting plant on its property near Pine flat. Several buildings and a large quantity of wood were burned, and the smelter damaged, entailing a total loss of several thousand dollars.

A proposition to erect a smelting plant within sight of the orange groves at Pasadena has caused a vigorous protest from the Pasadena board of trade and others, who demand that the county supervisors forbid it. The proposed site is in the Arroyo Seco at Garvanza, and it is objected that the smelter fumes are likely to be drawn between the slopes to suburban neighborhoods, where great damage might result.

State Mineralogist Lewis E. Aubury, who recently returned from St. Louis, where he had been in charge of the California mining exhibit, now proposes to make an investigation of the properties, stock-selling methods and good faith of several mining companies of this State that are seeking buyers of stock in Eastern States. Last year Mr. Aubury made a similar campaign against others who were successfully operating on the familiar lines.

The state mineralogist is to begin at once some original field work for the bulletin on California gems, the preparation of which has been in the charge of Dr. George F. Kunz, of New York, for some time, and which it is expected to have ready in January. Prof. T. H. Hopkins, of Syracuse University, is busily engaged, with assistants, on a bulletin on the structural materials and clays of the State, which will not be ready until next spring. This will be a voluminous and elaborate work and will be the first comprehensive study of the State's resources of this nature.

Denver. Sept. 17.

(From Our Special Correspondent.)

The latest sensation in mining circles has been the confession to the county attorney at Topeka, Kan., by B. F. Slagel, alias Robert Romaine, giving the details of the preparations for blowing up the Independence station and of a plot to blow up the Vindicator mine. In his statement Slagel claims to have been one of the strikers and to have assisted in arranging the dynamite which caused the death and maiming of so many non-union miners. He named a number of men who were implicated with him. To what extent his confession will be borne out by further inquiry is hard to say. Sheriff Bell, of Cripple Creek, says that Romaine has been under suspicion in connection with these and other crimes for some time. He has served a sentence for burglary and is now under arrest for a similar offence. The Topeka authorities, according to the latest advices, expect that the authorities of this State will take the necessary steps to secure him. The men whom he implicates are former officers and members of miners' unions in the district. President Moyer and Secretary Haywood, of the Western Federation of Miners, claim that Romaine was not a member of any union connected with the organization. Naturally, further developments are anxiously looked for.

An incident at the Old Gold mine, which adjoins the Henry Adney, where a couple of weeks ago an attempt was made to cripple the hoisting machinery, which might have caused a terrible accident, goes to show that there are still some desperate characters in the district. As Frank Harris, the engineer, stooped over to grasp the lever, a few minutes before the night shift was to be hoisted, a gun was stuck through an open window in the engine room and fired at him. Two men were seen running away. Harris was not hurt.

The criminal cases against the indicted union miners, numbering about 40, have been postponed to Nov. 15, and then the cases will probably be set for trial.

The news that a committee of six, representing the local union of the Western Federation of Miners at the new camp, Goldfield, Nev., had given E. B. Aker and L. W. Rope one hour to leave the camp, these parties having come there a few days ago from Cripple Creek, has been received here, and reports indicate that in order to prevent a recurrence there is talk of the formation of a Citizens' Alliance. At Leadville, in this State, a movement is on foot to prevent any of the deported men from Cripple Creek from obtaining work in that district. It is reported that some of the mine managers have already decided not to hire any miners without the proper credentials. Under the protection of the injunction granted by the Federal Court, the union stores in the Cripple Creek district will shortly be doing business again.

There is still considerable trouble in some of the coal camps of the southern part of the State. In response to a message, Sheriff Clark, of Trinidad, with a posse of 15 deputies, went to Tabasco a few days ago to intercept a large number of striking coal miners, evidently on their way to force non-union men to quit work in the mines. Fifteen men were arrested and taken to jail. A number of them were armed. At Starkville a number of strikers assaulted some company guards, and one of the former was mortally wounded. Three were arrested.

Mr. David H. Moffat has anonunced that the building of the Denver, Northwestern & Pacific railroad will be pushed, and it is expected that work will soon be begun from the Salt Lake City end.

The new trackage, construction and general improvements at the plant of the Independent Smelting and Refining Co., at Golden, are nearly completed, and at an early date the furnaces will be blown in. At the start the smelting capacity will be about 300 tons per day. All classes of ore excepting lead will be purchased. The company decided not to issue any regular schedule of smelting rates, preferring to quote an individual price for each ore, and special prices for low grade, desirable ores.

Butte. Sept. 14.

(From Our Special Correspondent.)

The small miner and prospector, in the opinion of your correspondent, does not meet with the encouragement he is entitled to in Montana when he must depend on selling his product to a custom smelter; particularly is this the case if the ore is only suitable for a lead smelter.

The only market for a lead-silver ore in the State is the American Smelting & Refining Co. plant at East Helena. The price of lead in New York has for some time averaged about $4.20 per 100 lb.; the price offered and paid the shipper at the East Helena smelter is $2 per 100 lb. for 90% of the lead content of ore. A deduction of $2.20 from the New York quotation is certainly excessive. The freight rate on base bullion from Helena to the eastern seaboard is 75c. per 100 lb., or $15 per ton in carload lots. Before the advent of the American Smelting & Refining Co. in this field the deductions on a lead content in an ore ranged from $1 to $1.50 per 100 lb. Then, again, the treatment charged on certain classes of ore is higher than under the old management. So, on the whole, the prospector finds little inducement to hunt for new mines.

Any number of small mines situated in the silver belt of this camp are in operation, generally by leasers. The silicious silver ore from these a few years ago carried such a high treatment charge that no profit could be found in sending it to the smelters. Now this class of ore, provided it is sufficiently high in that very content that a few years ago carried the penalty, will be handled on a rate that puts such properties in good demand.

Forest fires are doing any amount of damage to the mining regions of the State. The country west of Anaconda is on fire, and a number of miners' cabins and mine buildings have been destroyed.

Salt Lake City. Sept. 16.

(From Our Special Correspondent.)

Another concentrating mill is to be built at Alta. The plant will be erected by the Continental Alta Mines Corp., of which Henry W. Crowther, of Salt Lake, is manager. Its capacity will be 100 tons per day.

Two hundred men are now employed at the properties of the Newhouse Mines & Smelters Corp., in Beaver county, and the force is soon to be increased on account of the erection of the structural parts of the new mill buildings. The foundations have been completed, and some of the structural steel is being raised. Work on the company's three miles of railroad, which is to connect the mill with the main tunnel of the Cactus mine, at the mouth of which will be located the ore crushing department, is progressing.

The Ontario mill at Park City has resumed operations after being closed down for several months as a result of the fire which destroyed the hoisting plant at the mine. The latter is being operated again at full blast.

The management of the Lower Mammoth Mining Co., operating in the Tintic mining district, has decided to do some extensive leasing, and all the levels above the 1,000-ft. level will be let out in this manner.

The directors of the Comstock Silver Mining Co., of Park City, have decided on a $100,000 bond issue as a means of providing funds for the further development of its property. The bonds are to run for five years, and will draw interest at 7 per cent. The mine is equipped with a good mill.

The new lead stack at the United States smelter, at Bingham Junction, is nearing completion. In the meantime the ore purchasing department is filling the big bins erected. Before blowing-in it is the intention to have at least 25,000 tons of ore on hand as a reserve.

The Johnny mine, at Stateline, Iron county, has been closed down, and will probably be

abandoned. Developments on the lower level have been so disappointing that the directors finally decided that it is useless to expend any more money. The mine is well equipped with a fine hoist and a mill which was completed about a year ago and was operated but a short time. The mine was the mainstay of the town of Stateline, which will become practically deserted as a result of the shut-down. Excepting the work being done by a few prospectors there is nothing going on in the camp.

Dawson. Sept. 1.

(From Our Special Correspondent.)

Yukon and Tanana.—There has been a strike at Beaver creek, which has created excitement in the vicinity of Circle and Rampart. Beaver creek is a tributary of the Yukon river, which it enters near Fort Hamlin, about 300 miles below Circle. It heads in the same range as Birch creek, and in one place approaches the older and better-known creek. The discovery was made by a party of miners, who spent last winter at the head of the creek. They state that pans of wash run from 10c. to $1.50 a pan.

It is reported that there is trouble between the miners and the storekeepers of Tanana as to the price at which gold dust shall be received as trade. The miners demand that they shall be allowed $17 per oz., but the business men decline to allow more than $16. The miners claim that assay returns show the gold to be worth $17.51, but the storekeepers maintain that if they allow more than $16 they are losers in realizing on it.

It is announced that the building of the proposed railroad in the Tanana country is definitely assured, and that the equipment, including the rolling stock, is already on the way north. The road, as projected, will run to Golden City, the settlement on Discovery, Pedro creek, 14 miles from Fairbanks and 20 from Chena. The road running up Gold stream and thence up Pedro, a tributary, will reach all points where mining is in progress on the northern side of the divide. It is reported that the builders are more favorably disposed towards Chena as a terminal point than Fairbanks, on account of the superior transportation facilities at the former.

In connection with litigation between opposing factions holding interests in the Gold Run (Klondike) Mining Co., the conflicting interests have agreed upon Lieut. Wm. Bradley, an Englishman well known in the Klondike, in which he has been interested since 1898, as the inspector who shall have charge of the company's mining operations under the order made by Mr. Justice Craig, pending final judgment in the action now being prosecuted, and work on the company's property, which is very valuable, is to be resumed at once.

Reports brought to Dawson from Tanana are generally favorable as regards gold returns, but the question of transporting supplies to the creeks is at present a serious one to the miners, there being no roads in the country. It costs from 15 to 25c. per lb. to pack to the various creeks. One instance is mentioned where $2,200 was paid for hauling a 20-h.p. boiler 12 miles. Cleary creek has been attracting most attention up to the present, probably because the best dirt so far found has been located on that creek. The topography of the Tanana is stated to be similar to that of the Klondike. At the head of Pedro creek there is a huge dome, just as there is at the head of Bonanza, all the gold-bearing creeks radiating from the peak like the spokes of a wheel, as do Bonanza, Hunker, Dominion and Quartz creeks from the King dome.

The Northern Commercial Co. has established a new post on the upper Tanana, about 200 miles above Fairbanks. Ben Bennett is in charge. This post is at the mouth of the Big Delta, a tributary of the Tanana, 12 miles above the United States telegraph station at Salt Jacket. Some discoveries have recently been made on the Big Delta, but their extent has not yet been learned, none of the prospectors having yet come out. Good reports have been brought out from Shaw creek, another tributary of the Tanana. The latter discoveries have been made at about 80 miles from the mouth. Both the Big Delta and Shaw creek head in the Coast range, near Mount McKinley.

Toronto. Sept. 15.

(From Our Special Correspondent.)

The Banque Broquard of Paris has entered an action in the court in Toronto on behalf of itself and the shareholders of the Gold Run Klondike Mining Co. of London against the Canadian Gold Mining Concession Co. of Ottawa and Mme. Belinda Carbonneau, of Dawson City. The plaintiffs ask for a declaration of the court that the claim known as the Crenger concession, granted on October 27, 1900, is the property of the Gold Run Klondike Mining Co. The case was originally assigned by Crenger, the discoverer of the claim, to Mme. Carbonneau, who re-assigned it to the Ottawa company. The claim of the plaintiffs is that the latter holds it only as trustee for the Gold Run Klondike Company.

Negotiations are on foot at Ottawa to establish in that district works for the melting of iron ore and the manufacture of iron and steel by the electric process. P. Herault, the inventor of the process, was in Ottawa recently and while there interviewed local capitalists and made investigations as to the iron deposits in the neighborhood.

One of the Ontario government diamond drills was shipped this week over the newly opened Temiskaming & Northern Ontario railway to the iron range on the northeast arm of Lake Temagami to test the value of this deposit. The discovery was made some years ago by D. O'Connor, of Sudbury. The outcrop consists mainly of magnetite ore banded with jasper, but some hematite has also been found. The construction of the railway has rendered the claim accessible and Sir William Mulock and T. B. Caldwell, of Lanark, are associated with Mr. O'Connor in the enterprise.

The Northern Light Mines Co. is erecting a 5-stamp mill at the Baden-Powell gold mine on Eagle lake, near Rat Portage. There is ore enough on the dump to keep it running for 12 months.

S. H. C. Miner, president of the Granby Consolidated Mining & Smelting Co., on his return to Montreal from Boston on September 12 stated that he had sold out his controlling interest in the company to J. J. Hill and his friends of the Great Northern railway. The entire business of the company, which totalled nearly $50,000 per month, has up to the present been handled by the Canadian Pacific railway, and the object of the purchase is to secure this traffic. The Granby mine is a low-grade copper proposition, at Phœnix, about 25 miles from Grand Forks, B. C., and the ore has to be transported to the latter point, entailing an enormous amount of freight tonnage. The Granby is made up of several properties which were at first floated separately, but subsequently combined under one management. The authorized capital is $15,000,000, of which $13,363,000 is subscribed and paid up. At present it is realizing a net monthly profit of from $30,000 to $40,000. The stock was formerly nearly all owned in Montreal, but latterly considerable amounts of it have passed into the hands of Boston capitalists. The ore beds are said to be practically inexhaustible. The properties known as Knob Hill and Old Ironsides are among the company's principal holdings.

A difficulty has arisen in connection with the application for the bounty upon 50,000 lb. of pig lead claimed from the government by a company at Bannockburn, Ont. The company did not comply with the regulations in keeping track of the quantity of ore from which the lead was obtained, and while there is no dispute as to their having earned the bounty it cannot be paid unless some change is made in the regulations.

Victoria. Sept. 13.

(From Our Special Correspondent.)

The Canadian Pacific Railway Co.'s anthracite coal mine near Banff, Alberta, along the company's transcontinental railway, is now sufficiently developed to allow of the coal being placed on the market for sale. The coal is stated to be smokeless and particularly clean, and more efficient for domestic purposes than any of the soft coals on the local market. Arrangements are being made for the appointment of selling agents in the coast cities of British Columbia.

Information comes from Montreal to the effect that the project to establish lead-corroding works in that city is to be carried into effect with as little delay as possible. Premises for the industry have been secured at Montreal, and arrangements made with the Canadian Pacific Railway Co. for a suitable freight rate on the raw material from British Columbia. It is probable that the chief supply of lead will be obtained from the Canadian Smelting Works, Trail, the management of which a few weeks ago announced that negotiations were in progress for the establishment of lead-corroding works in one of the eastern Canadian cities. The Carter White Lead Co., of Chicago, is reported to have this industry in hand, which is a new one for Canada.

The Provincial Mineralogist, who has been visiting mines in the Nelson and Slocan mining districts since early in the summer, is expected to return shortly to headquarters in Victoria. The Provincial Assayer has also spent a couple of months visiting mining properties, but he has given his attention to coast districts. The Deputy Minister of Mines has just returned from an official visit to the Atlin gold mining district, in the northwestern part of the Province.

The Coast.—The Tyee Copper Co.'s smelter, at Ladysmith, Vancouver Island, was in operation for 23 days during the month of August and smelted 4,587 tons of ore from the Tyee mine, at Mount Sicker. The return, after the deduction of freight and refining charges, is $59,224. At the mine the main shaft is now down nearly 600 ft. The indications are favorable at that depth for meeting with another shoot of ore.

Revelstoke.—The Carnes Creek Consolidated Mining Co.'s properties, in the Big Bend district, on the Columbia river above Revelstoke, have recently been visited by Mr. Alex. Sharp, for the purpose of advising one of the principal shareholders as to the advisability of resuming development operations. It is probable that the decision will be favorable to more work being done on the claims.

The Prince Mining & Development Co., which owns the Standard group, situated about 33 miles north of Revelstoke and 6 miles west of the Columbia river, is sending up supplies, its intention being to work the property all next winter. The vein already opened up shows 5 to 6 ft. of ore, chiefly copper pyrites, with gold and silver values.

Ferguson.—The Silver Cup Co.'s mill at Five-Mile is reported to be running satisfactorily, although to some extent hampered by a shortness of water attributable to the dryness of the season. Some pieces of machinery and a pump have been lacking, but when these have been received and the water supply augmented the mill will, it is anticipated, make an excellent showing. The repairs to the Silver Cup aerial ropeways have been completed and transportation facilities are now as good as they were before last spring's snowslides interrupted them. An ample supply of ore is now available for the mill.

The Badshot mine, on Gainer creek, has been leased by a local syndicate, and already the shipment of ore has been commenced. This property is one of those known as the "lime dyke series," the big "lime dyke," being one of the most prominent geological features of this part of the Lardeau country. One vein on the Badshot, outcropping alongside the dyke, was lately described by Mr. R. W. Brock, of the Canadian Geological Survey, as being several feet in width of decomposed calcite, quartz, galena and tetrahedrite. A galena vein, 18 in. in width and said to run $5 per ton in gold, 235 oz. in silver and 75 per cent. lead, has also been opened up.

The Kootenay Consolidated Mining Co., of Minneapolis, has begun to have ore packed out from its Old Gold claim, on the Duncan slope. This company is a consolidation of five or six other companies formerly holding groups of mineral claims on the divide between the Duncan and Lardeau watersheds, and it plans extensive mining operations in the district when it has overcome existing difficulties of transportation.

East Kootenay.—During August about 1,800 tons of concentrates were shipped from the St. Eugene mine. The shortness of water

necessitated the mill being run on a light feed, but it is anticipated that it will be practicable to keep the mill running at reduced capacity until rain shall increase the water supply.

It is reported that a new body of ore has been discovered in the North Star mine, at Kimberley, but the report has not yet been confirmed. Some months ago it was resolved to wind up the company, as neither extensive prospecting nor the reports of mining engineers gave encouragement to continue the search for more ore. The North Star company paid altogether $312,000 in dividends.

Monterey. Sept. 14.

(From Our Special Correspondent.)

It is understood that the Monterey plant of the American Smelting and Refining Co. ranks second among the plants of the company in the tonnage of lead ores smelted during the month of August. This is the result of the policy of the company to keep the plants up to a modern standard. The automatic coupling mill has been running for a month, and has cut down over one-third the expenses of that department. The clearing away of the old mill will give much needed yard room for the beds and the unloading of cars. A change in the method of handling this work has also resulted in a material reduction of expenses. In addition to the new sampling mill is a No. 6 Gates rock and ore crusher, for crushing lime and coarse ores before they are fed into the furnaces, with a Robins belt conveyor to carry them to the bins, and a 250 k.w. generator directly connected with a Nordberg compound engine. Over 27,000 tons were smelted in August. The remaining months of the year will probably show a decrease, because of the necessity of closing down some of the furnaces, while they are being altered for the mechanical feed arrangement. The sale of the San Salvador, of Minas Nuevas, on Mitre mountain, near Monterey, which employs 500 men, by Emeterio de la Garza to Edward Doerr and a stock company is reported. An excellent, though low grade, fluxing ore for the smelters will be available. A recently constructed tram conducts all ores from the mine to the railroad. In the Diente or San Pablo district the vein has been struck in the Victoria shaft of the Mexican Lead Co.'s property. This company was organized in 1899, under the laws of New Jersey, with $7,500,000, gold, capital; $1,500,000 preferred. R. S. Towne is president. It is now employing 400 men, owns the San Pedro, San Felipe and Crisonta mines, and leases the San Pablo, Denver, and San Marcos. It has a 700 m. tram from the tunnel to the railroad, and its own railroad, 12 miles long, from Diente to the Monterey smelters.

The Laredo Mining and Smelting Co. is a new company with $250,000 gold capital. C. G. Brewster is president and W. N. Banks, manager. It will operate La B mine in the Gallina district of Nuevo Leon. The Harrison smelter of Cerralvo, 90 miles northwest from Monterey, is treating from 4,000 to 5,000 tons of ore a month and shipping the bullion to the Monterey plant of the American Smelting & Refining Co.

London. Sept. 10.

(From Our Special Correspondent.)

The royal commission sitting at Kalgoorlie to inquire into the circumstances of the Great Boulder Deep fiasco has received considerable attention here on the part of everybody interested in mining matters, but I have not referred to it before, because the reports of the proceedings have been far from complete, and also because it is alleged that full information has not been given in the evidence. It seems fairly obvious, however, that reports on the development were manipulated for somebody's benefit by Mr. H. Nichols at the instigation of Mr. Frank Gardner during the absence of Mr. Ralph Nichols. The chief reason why I mention the case at the present time is to record that the directors of the Great Boulder Perseverance collectively and Mr. Frank Gardner, the chairman, individually, have agreed that their case shall be investigated by the same commission that is now sitting on Great Boulder Deeps. The Perseverance case is a much more important one than that of the Deeps, for it is a company that has been in existence for several years and paid handsome dividends, whereas the "Deeps" was only a comparatively new venture. For some years it paid handsome dividends after emerging from a long struggle, during which Mr. Gardner supported it loyally with extra working capital. It was only when developments pointed to the approaching exhaustion of the higher grade ores that methods requiring strict investigation were indulged in.

Last week I referred to the speculation going on in the shares of the Rhodesia Exploration and the Lomagunda companies. Rumors were circulated widely that banket formation had been discovered on the properties belonging to the companies and considerable speculation was indulged in on the Stock Exchange, all the while the companies issuing no statement to their shareholders. The suspicion was justified that somebody was reaping benefit from prior knowledge. This week the Rhodesia Exploration Co. has issued a circular to its shareholders purporting to give an explanation of the delay in making a statement. It states that the properties belong to the Scottish Mashonaland company and the Lomagunda company, and that the Rhodesia Exploration Co. wanted to get a larger interest in the properties for the benefit of their shareholders before making the facts public. It happens that both these companies are subsidiary flotations of the Rhodesia Exploration, occupy the same offices, and their staffs and directorates are nearly identical. So that the excuse, on the face of it, looks rather a lame one. However, the circular definitely states that excavations on old workings have proved the existence of a gold-bearing conglomerate. It is situated in the Lomagunda district of southern Rhodesia, not far from the railway that connects the Ayrshire mine with Salisbury. The properties have belonged to the present group for over 10 years, but exploration at this particular point was only recently begun. The old workings go down 200 ft. and are mostly filled up with the "dust of ages." So far as work has been done on the Eldorado mine, as this section is called, the deposit appears to average 5 ft. wide and to assay $19 per ton. Dr. Hans Sauer vouches for the correctness of this information, but further details are not as yet forthcoming.

Another case of "intelligent anticipation" is to be found in the Coronation Syndicate, the shares of which have recently slumped severely without any obvious reason. For quite a while the shareholders and the public were without any information on the subject, and it is only this week that a bald statement has been issued by Barnato's. The Coronation Syndicate was formed in 1902 to acquire land at the extreme southeast of the Rand. The capital was £150,000, in shares of £100 each, and for a long time there was a very active market, the shares going up to £3,000 each, and being talked up to ten times as high. It was all a wild speculation, for the values of the outcrops were low, and their connection with the Rand series was not settled. For two years the market quotation for the shares was maintained at a high level, never being less than £1,000, but during the last month or so the drop has been rapid, and they now stand at less than par. It is obvious that somebody knew the actual state of things, although the public and shareholders generally did not. This week Barnato's have issued short statements showing that Dr. Corstorphine, the geologist, and Mr. J. H. Johns, the consulting engineer, have presented very unfavorable reports as to the value or the possibilities of the continuation of the deposits. Dr. Corstorphine originally considered it probable that the deposit was a continuation of the Main Reef, but has now abandoned that hope. Mr. J. H. Johns and Professor J. G. Lawn are of the opinion that this geological point is as yet unsettled and requires further investigation, but they agree with Dr. Corstorphine that the value of the deposits is problematical.

Johannesburg. Aug. 22.

(From Our Special Correspondent.)

Two rather important strikes have been recorded recently. The first, about 20 miles south of Vereeniging, on the Cape line, in the Orange River colony, where Messrs. Lewis and Marks have just struck a big 40-ft. seam of coal at a depth of 600 ft. The calorific value of the coal is 11.88, and the ash percentage 7.53. The second find is a splendid diamond weighing 198 carats, near Pretoria, on the property of the Pretoria District Diamond Co.

It is interesting to note that, as the result of the publication of the rich check assays of the core from the borehole on Daspoort, in the Heidelberg district, the prices obtained for lapsed claims on Daspoort and adjoining farms ranged from 10s. to 35s. per claim at the government sale on August 9. Upwards of 3,000 claims were offered, but very few were sold, as the richness of the reef struck on Daspoort has satisfied most claim holders and others that the reef struck in the borehole was the South reef of the Main reef series, and all who held claims behind this line of reef promptly decided to drop them, as only a few obstinate people, unable to accept the logic of facts, who still fancy claims behind this Daspoort reef. This explanation is necessary, as from the accounts published in newspapers here one would imagine that the claims so sold at public auction were actually on the same line of reef as that cut in the borehole.

Burglars are having a happy time here just now, and what puzzles the public is how they get their spoil away. Many people think that our cab drivers must be in league with the burglars, and it has been suggested that photographs of all our cabmen be taken, and circulated among the police of Europe. Our Kaffirs are also becoming demoralized, as the result of coming in contact with low-class white men, and assaults by Kaffirs are becoming common. Under our present law, no Kaffir can be flogged on first conviction, and, in the opinion of those who know the Kaffirs well, this is a direct incitement to crime, as the Kaffir does not care two pins about imprisonment, and restrictions as to flogging make it impossible for the warders to get anything more than a mere semblance of work out of the black convict.

One of the most important questions with which our semi-representative government of next session will have to deal is the native land question. Under the present law, natives have no right to own personally land in the Transvaal, although immense reserves have been set aside for natives only. In Natal, there is a law which allows educated Kaffirs to purchase land, and the result of this law has been that these educated Kaffirs have become the virtual chiefs of large Kaffir syndicates, which have been formed to buy up land through the medium of the educated Kaffir. No white man can compete with these Kaffirs, if they want to buy a farm, as they will always pay a price which is prohibitive for a white man, and, once the land is occupied by Kaffirs, it is practically sealed to civilization. A few years ago this was bad enough, but now that we have the Ethiopian Church in full swing, it is much worse. The white missionary was always a link between the Kaffir and civilization; now that the missionary is being replaced by the Ethiopian minister, the Kaffirs born and brought up on such Kaffir farms never come into touch with civilization, until they are caught sheep stealing, taken before a magistrate, and condemned to some trivial punishment, which confirms their opinion of the imbecility of white people. The ownership of land is, in the opinion of the Kaffir, the first, last, and greatest right of the ruler, and when white men forget or misunderstand their position as rulers, and begin to allow Kaffirs to purchase land, the end of the white man's rule in South Africa is in sight, as it is only a matter of time till he will be so bought out by the Kaffir that, without any revolution, South Africa will become a second Liberia or Hayti. It may be argued that the ownership of property is the only way to make Kaffirs diligent, but if the raising of the Kaffir means the erasing of the white man, let us leave the raising of the Kaffir to the Kaffir himself.

TO ENGINEERS VISITING NEW YORK.

A room for the exclusive use of visiting mining engineers is maintained at the New York office of the ENGINEERING AND MINING JOURNAL. Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the JOURNAL, and making this office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and to be of any service to them that they can.

TO ENGINEERS VISITING LONDON.

We are informed that the Institution of Mining and Metallurgy offers to all members of the American Institute of Mining Engineers nonresident in Great Britain the privilege of free use of the Institution offices and library in Salisbury House, London Wall, E. C. Visiting engineers may have their letters addressed to the offices of the Institution, and thus enjoy the advantages of temporary office accommodation in the city of London.

PERSONAL.

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Mr. Thomas F. Walsh is at the Waldorf.

Mr. H. L. Hollis, of Chicago, is visiting Boston.

Mr. I. C. Fuller, of London, is now in this country.

Mr. C. Q. Payne is in Nevada on professional business.

Mr. H. C. Hoover has returned to London from the Transvaal.

Mr. Thos. H. Leggett is expected in New York, from London.

Mr. J. Dunraven Young, has returned to Chicago from London.

Mr. F. J. Siebert, of Burger & Siebert, has returned to New York.

Mr. D. P. Rohlfing is inspecting properties in Idaho and Montana.

Mr. F. J. H. Merrill has been visiting the Exposition at St. Louis.

Mr. Sidney Jennings is on his way from London to Johannesburg.

Mr. Floyd Davis is looking after mining interests in Sonora, Mexico.

Mr. Gardner F. Williams has arrived in London from Kimberley.

Mr. Charles M. MacNeill, of Colorado Springs, is at the Waldorf.

Mr. A. C. Beatty returned from London by the *Lucania* on September 17.

Mr. T. L. Bush sailed from Southampton for South Africa on September 11.

Mr. F. W. Baker arrived in New York by the *New York* on September 18.

Mr. Jacob Langeloth returned from Europe by the *Blücher* on September 18.

Mr. L. C. Stuckey is on his way from London to Adelaide, South Australia.

Mr. Hiram W. Hixon returns on October 1 to the service of the Mond Nickel Co.

Mr. John H. Talbot is in this country from the Reina del Oro mines, Sonora, Mexico.

Mr. Rufus M. Bagg, recently at Socorro, New Mexico, is now at Coronado, California.

Mr. C. W. Luck has been inspecting mining property in the Imnaha district, Washington.

Mr. Walter Fitch is at Salt Lake City. He will study the methods of reduction in Utah.

Mr. L. J. Hartzell has been appointed to a professorship in the Montana School of Mines.

Mr. Chas. S. Palmer has left Anaconda, Mont., and is now at Chicopee, Massachusetts.

Mr. James W. Malcolmson proceeded to London by the *Etruria*, sailing on September 17.

Mr. Edwin E. Chase, who has been examining mines at Basin, Mont., has returned to Denver.

Mr. G. W. Miller is installing milling machinery at the Rising Sun mine, Lincoln county, Idaho.

Mr. Augusto Ramos, of the Polytechnic Institute at Sao Paulo, Brazil, is now in this country.

Mr. Rupert Alabaster and Mr. F. H. Wintle reached New York by the Arabic on September 18.

Alexander Zelewsky, chief engineer of Ganz & Co., of Budapest, Hungary, is now in this country.

Mr. Frank Klepetko is now consulting engineer for the Hermina Mining Co., Sudbury district, Ontario.

Mr. L. H. L. Huddart is leaving England to take an appointment on the mineral survey of southern Nigeria.

Mr. W. T. Frazier, superintendent of the Alder Creek Gold Mining Co., at Flat Iron, S. D., is in Colorado.

Mr. H. Deane, chief engineer of the New South Wales Government Railways and Tramways, is in New York.

Mr. Erich Meurer, of Cologne, is visiting the coal mines of Pennsylvania and the mining regions of Lake Superior.

Mr. Robert T. Hill is conducting a party of members of the International Geographic Congress to Arizona and Mexico.

Mr. F. C. Armstrong, of Dick, Kerr & Co., Ltd., one of the largest electrical manufacturers in England, is in New York City.

Mr. C. O. Baker, president of Baker & Co., Inc., of Newark, N. J., and New York City, recently returned from a European trip.

Mr. Ferdinand Susteric has been appointed manager of the Amparo Mining Co.'s property in the State of Guadaljara, Mexico.

Mr. Bernard MacDonald, of Spokane, Wash., is superintending the erection of a cyanide plant at Guanajuato, Mexico.

Mr. Paul Flury, who has been at El Paso, Texas, and in Mexico, has bought the Washington State laboratory, in Seattle, Washington.

Mr. George D. James, of Denver, has gone to Tonopah, Goldfield, and other Nevada mining districts and will return to Denver about September 30.

Mr. J. H. McNabe has returned from London and will resume charge of the harbor construction work under Pearson & Son, Ltd., at Salina Cruz, Mexico.

Mr. Fred Crabtree has been appointed to the chair of mining and metallurgy at Colorado College. Mr. Crabtree is a graduate of the Massachusetts Institute of Technology.

Mr. Geo. A. Laird, until recently manager of La Victoria y Anexas mine, San Luis Potosi, Mex., has taken charge of the Calderona property, in the vicinity of Ojo Caliente, State of Zacatecas, Mexico.

Mr. Hart Mix, who has been for 20 years in the mining districts of South America and South Africa, has been visiting relatives in Danville, Ia. He sailed for London on the *Kronprinz Wilhelm* on September 20.

Mr. W. R. Whitney has resigned as professor of theoretical chemistry at the Massachusetts Institute of Technology to take charge of the research laboratories of the General Electric Co., at Schenectady, New York.

Mr. Thomas L. Watson, professor of geology in the Virginia Polytechnic Institute, has been put in charge of a geological survey of that State. The survey is to be conducted jointly by the Polytechnic Institute and the State Board of Agriculture.

Mr. G. H. Barnhart has resigned as resident manager of the Ymir Gold mines, B. C., to give his attention to the operations at the Porto Rico mine and mill, near Nelson, on which he has recently acquired a three years' lease. He is succeeded at the Ymir mine by Mr. S. J. Speak, of London.

Mr. Nicholas J. Martin has resigned as general superintendent of the North American Copper Co., of Wyoming, taking effect September 15, and will leave shortly after for Copiapa, Chile, to erect and blow in the new reduction works of the Sociadad Industrial de Atacoma. Mr. S. S. Raymond, of San Francisco, succeeds him at Encampment.

OBITUARY.

Frederick Crosswell Rowland died at New Haven, Conn., September 8, aged 60 years. He was superintendent and general manager of the Norwalk Iron Works and, later, head of the New Haven engineering firm of F. C. & A. E. Rowland.

Philip W. Moen, a retired wire manufacturer of Worcester, Mass., died suddenly on September 12, at Shrewsbury, Mass., of apoplexy. He was born in Worcester forty-seven years ago, and was a son of the late Philip L. Moen, who established the great wire industry of Worcester with Ichabod Washburn.

SOCIETIES AND TECHNICAL SCHOOLS

Colorado School of Mines.—The yearly session of this school begun September 6. There is a total attendance of 300 students.

Iron & Steel Institute.—The revised itinerary to be followed at the meeting of this society October 27 to November 12 includes excursions from New York to Cleveland and New York to St. Louis, with visits to Philadelphia, Pittsburg, Bethlehem, Schenectady, Niagara Falls and Washington.

Columbia University.—Plans for the new School of Mines building have been filed. It will be a four-story and basement edifice, with a frontage of 145 ft. and a depth of 57 ft. The basement and first story will contain large halls for the ore-dressing machinery and the furnaces and the metallurgical laboratories. On the second floor will be the mining and metallurgical museums and the lecture hall. The third floor will accommodate the library, the research laboratories and testing room, together with the school offices and the pyrometer and microscope room, while the fourth story will contain the drafting rooms and studios. The cost of the building is estimated at $250,000.

TRADE CATALOGUES.

The Vulcan Iron Works Co., of Toledo, O is sending out an electoral chart for 1904. It represents in a graphic manner the votes of the States in the last national election.

In Circulars No. 49 and 51 the United Telpherage Co., of New York, presents examples of the use and operations of its telphers applied to the production of coal and coke, and gives details concerning some difficult telpherage engineering.

Clement Restein & Co., of Philadelphia, has issued a transcript of the decision of the United States Court for the Eastern District of Pennsylvania in the case of Charles A. Daniel vs. Restein & Co. for infringement in making fibrous packing. The bill was dismissed with costs.

Powell & Colne, of 11 Broadway, New York City, United States agents for the Trapenes converter steel process, state in circulars that the process is specially well adapted for making medium and small castings, but is also adapted to the manufacture of large castings. Since its introduction in this country 17 plants with 23 converters have been erected.

A booklet of unusual artistic merit, entitled 'Concrete Construction,' has been prepared by the Engineering Company of America. It is a historical treatise on the use of concrete from the earliest times. The cover is a striking design illustrating ancient Egyptian builders using concrete. The different ways of reinforcing concrete with steel are also shown. The pamphlet is handsomely illustrated.

'Hints About Camping' is the title of an excellent little pamphlet issued by the Canadian Pacific railway. It tells the novice what to take with him when he starts for the woods and how to prepare for his expedition. Practical experience dictates the advice given. There is a careful list of stores to be taken, a number of simple receipts for the cooking of birds and fish in the woods, and a few directions for the preservation of skins and heads until a taxidermist can be reached. Careful study of the 'Hints' will save many annoying mistakes. The Canadian Pacific Railway Co. distributes the book free through its agents or on application to its advertising agent or tourist agent, Windsor Station, Montreal.

INDUSTRIAL.

Within the past few weeks the Salt Lake Hardware Co., of Salt Lake City, has made shipments of Keller balances to Butte, Mont., San Francisco, Los Angeles and Mexico.

The Chilean Government has placed a large order for equipment with the Ingersoll-Sergeant Drill Co., including a large Corliss compound compressor and a full complement of Haeseler pneumatic tools for one of its largest ship-yards.

The Homestake Mining Co., of Lead, S. D., after having given the Stromberg-Carlson telephone system a thorough trial has recently placed an order with that company for a number of telephones.

Wonham & Magor, of New York City, have sold the New York Contracting Co.—Pennsylvania Terminal—12 new Porter locomotives and 150 dump cars, which will be used on work in New York City.

The Esperanza Mining Co., which operates a large property in the El Oro district, Mexico, is to abandon the use of steam power for electricity. The current will be transmitted from the Necaxa plant of the Mexican Light & Power Co. Mr. J. T. Hill, electrical engineer, Mexico City, is in charge of the Esperanza installation work.

The Pittsburg Reduction Co., of Pittsburg, with works at Niagara Falls, N. Y., and New Kensington, Pa., manufacturers of pure aluminum, will install mills at the New Kensington works for the rolling of aluminum sheets. A contract has been placed with the A. Garrison Foundry Co., of Pittsburg, for the building of three 28-in. plate mills.

The Harbison Refractories Co. advise that the recent fire at the Hays works will not in any way affect deliveries on orders. No. 1 and No. 2 works were unaffected by the fire, and it will be possible to make shipments without interruption from these works. Arrangements have been made so that the friends of the Refractories company will suffer no inconvenience from this accident.

It is reported that a power plant will be constructed at the Eldorado station on the Parral branch of the Mexican Central railway, State of Chihuahua, from which the electric current will be carried to the Central Mining property at Almoyola. The property has lately been purchased by N. O. Bagge, of Los Angeles, Cal., who proposes to utilize electricity on a somewhat extensive scale.

The Riverside Metal Refining Co., of Connellsville, Pa., has succeeded the Riverside Manufacturing and Supply Co., Ltd. The business of the old company has so outgrown its capacity, facilities and equipment that increased capital and a larger plant became necessities. The officers of the new company are E. T. Norton, president; W. G. Marqua, secretary; John L. Gans, treasurer; T. E. McDermott, superintendent.

The Northern Electrical Manufacturing Co., of Madison, Wis., has been awarded the contract for the entire motor equipment of the new shops of the Southern Railway Co. at Spencer, N. C., designed by W. S. D. Cushing, signal and electrical engineer of the Southern Railway Co. About 450 h.p. of motors will be required. A combination of group and individual drive will be used, and all motor-driven tools requiring speed variation are to be equipped with Northern two-wire, variable speed motors. This company will also furnish a 50-k.w. generator for lighting the shops of the company at Alexandria, Virginia.

One of the three 8,000-h.p. Westinghouse-Parsons steam turbines which are being built by the Westinghouse Electric & Manufacturing Co., at East Pittsburg, for the New York and Long Island railroad, was recently tested at the Westinghouse works. The test was conducted with entire success, the machine being operated at its full capacity of 5,500 k.w., or 8,000 h.p., running 750 rev. per min. Including the generator, the dimensions of the turbine are: Maximum length, 47 ft. 3.5 in.; width, 15 ft. 8 in.; height, 14 ft.; total weight, exclusive of generator, 350,000 lb.; weight of revolving element, 47,600 lb. It is of the regular Westinghouse-Parsons construction, and is the largest ever built.

The Hazard Manufacturing Co., of Wilkesbarre, Pa., announces that the sale of its wire rope product in Chicago and western territory has been brought under its own management. The company has established its offices and warehouse at No. 71 and 73 West Adams St., Chicago. Mr. Robert A. Peet, who for the past three years has had charge of the sale of the insulated wires and cables manufactured by the company, has been made sales agent of the entire product in this territory. Mr. Homer A. Wessel, Jr., has been sent from the works at Wilkesbarre as his assistant. This departure is caused by the widening of the company's manufactures, and the development of many specialties in wire-rope manufacture.

The Colorado Iron Works Co. of Denver, Colo., states that it has recently moved its city offices from 721 Seventeenth street to more commodious quarters at 515 Seventeenth street, where it now occupies a large part of the ground floor of the McPhee Building. The offices have been fitted up for the reception of visiting mining men, who are invited to have their mail addressed there and to consider the new city offices their headquarters while in town. Several of the company's leading manufactures have been installed for inspection, thus saving visitors a journey to the main offices and works at 33d and Wynkoop streets. The machinery includes a set of heavy 40 in. by 16-in. improved standard wide-faced crushing rolls; a set of 30 in. by 6 in. narrow-faced high-speed crushing rolls; 7 in. by 10 in. Blake crusher; a sample grinder; 7 in. by 11 in. Dodge crusher; 1904 latest model, rubber top Bartlett concentrating table; improved impact screen, and an assortment of ore cars, buckets, trucks, blast gates, turntables, etc.

GENERAL MINING NEWS.

ALABAMA.

DE KALB COUNTY.

Battelle.—This furnace at Battelle has gone into blast. Its capacity is 250 to 500 tons per

ARIZONA.

COCHISE COUNTY.

Higgins.—A good strike is reported at this mine at Bisbee.

Michizona Development Co.—This company has begun active development on its 18 claims near Pearce. Michigan capital is interested.

(*From an Occasional Correspondent.*)

Paradise District.—Among the most prominent claims, more or less developed in this district, are the Oregon, Davis, Scanlon, Ophir, Burns, Smith, Rieder, Sullivan, Walker and Gardner groups. The Sullivan group of seven claims owned by John Sullivan, is about four miles west from the works of the Chiricahua Development Co. It has been developed by the owner by shallow shafts and open cuts, showing rock heavily stained with copper, but the development has not penetrated below oxidization. The property is under bond to the Duluth & Chiricahua Development Co.

The Rieder group, about one mile east of the Sullivan, consists of 10 claims. The ore is a fine-grained quartzite, carrying sulphurets of iron and copper. Ulrick Rieder, the owner, recently bonded the property. The Davis group, about two miles east of Paradise, has been bonded to the Cochise Consolidated Copper Co., of which Harry Alexander, of New York, is president; W. C. Hagan, of Pittsburg, Pa., vice-president, and C. B. James, of Scranton, Pa., secretary and treasurer. The capital stock is $5,000,000, in $1 shares. Howard H. Douglas, of New York, is consulting engineer. The company has 20 men employed and intends to increase the force to 40. The town of Paradise continues to grow, but there is still a surplus of labor. The Chiricahua Development Co. has its shaft down over 250 ft., and is sinking to the 500-ft. level, where it will begin cross-cutting. The Leadville claim, half a mile west of Paradise, is under lease to a local company of Paradise men, who are shipping about two carloads of lead ore per month.

GRAHAM COUNTY.

Arizona Copper Company, Ltd.—The production for the month of August was 1,091 tons of copper. Muddy water has considerably interfered with operations.

MARICOPA COUNTY.

Oriental.—These copper mines in the Cave Creek district, north of Phœnix, have been sold by A. S. Mills to St. Louis, Mo., and Arizona men. The Oriental Copper Co., of Arizona, has been formed with the following officers and directors: N. M. Clemmons, W. T. Smith, Emil Ganz, E. B. Lane, S. P. Weller, F. W. Ireland, Sim T. Price, T. J. Wolfley and A. S. Mills; N. M. Clemmons, president; E. B. Lane, first vice-president; Emil Ganz, second vice-president; T. J. Wolfley, secretary and treasurer; Sim T. Price, general counsellor, and A. S. Mills, superintendent.

MOHAVE COUNTY.

Gold Road.—A good strike is reported in the crosscut from the 20-ft. level at this mine, near Kingman.

Stockton Hill Mining Co.—It is reported that this company will erect a milling plant at its property on Stockton hill.

SANTA CRUZ COUNTY.

Joplin.—This group of mines in the Tyndall mining district has been sold to the Springfield-Arizona Mining Co., of Springfield, Mass., for a reported price of $20,000.

YAVAPAI COUNTY.

Coronado Gold Mining Co.—This company has purchased a set of machinery, including engine, boiler and air-compressor, for its property at Coronado.

Tiger Gold Mining Co.—This company is making extensive improvements on its property at Prescott.

YUMA COUNTY.

Amalgamated Gold Mines Co.—It is reported that a 120-stamp mill will be installed on this company's property near Quartzite. W. R. Russell is in charge.

Socorro Mining Co.—Work has been resumed on this company's property near Harrisburg.

CALIFORNIA.

AMADOR COUNTY.

Argonaut.—Sinking continues steadily at this mine, W. F. Detert superintendent. The shaft is now down 2,500 ft. The mill will be started when the shaft reaches the depth now planned, and much ore is accumulating.

Wildman.—At this mine 25 men are engaged in repairs, pumping, etc., in preparation for a resumption of operations.

CALAVERAS COUNTY.

North Star.—It is reported that Eastern parties who recently bonded this and four adjoining claims, adjoining the Gold Cliff, are to begin active operations at once and will erect a mill. John Jacobs is to be superintendent.

EL DORADO COUNTY.

Eureka.—At this gold quartz property at Georgetown the El Dorado Copper Mining Co. will place new boilers and pumps in the 3-compartment shaft, which is now down 200 ft. It is announced that operations will then be resumed.

Ida Mitchell.—An air compressor is to be installed at this old mine in Placerville. The new shaft has now reached a depth of 400 ft. Drifting is proceeding on the 200-ft. level.

Mameluke.—The company which has bought this old mine in the Georgetown district has made the final payment and work will soon be resumed.

Rescue.—At this mine grading has begun for a new hoist and a 5-stamp mill. It is stated that the 60-ft. shaft has developed a 2-ft body of good ore.

Zantgraf Extension.—A mill will soon be erected at this mine in the western part of the county, the developments made during the past few months warranting the step and giving promise of a valuable property. F. B. Norton is superintendent.

LOS ANGELES COUNTY

Ames.—Extensive development work is being done by the Native Sons Mining Co. in this mine, and a stamp mill and small smelter will soon be erected.

Bighorn.—At this mine on the upper San Gabriel river the Lowell & California Mining Co. is now operating the 10-stamp mill night and day.

MARIPOSA COUNTY.

Mariposa Mining and Commercial Co.—This company has completed a 5-stamp mill at Benton Mills on the Merced river, to be used for testing ores from the Josephine, Pine Tree and others of the company's mines on the grant. The mill will also do some custom work. C. C. Derby is superintendent.

PLACER COUNTY.

Ludquist.—This mine, near Auburn, has been leased for five years to A. J. Tubbs of Lewiston, Montana, who will at once begin work in the old tunnel. G. K. Orr will be superintendent.

RIVERSIDE COUNTY.

Roosevelt.—This property, which has been developed by Pasadena people during three years, is ready to begin operations. The first regular clean-up at the 10-stamp mill was made September 15, and 30 stamps will be added to the mill.

SAN BERNARDINO COUNTY.

Empire Mining Co.—This company is developing a mine in Newberry mountain, and a tunnel is now in 450 ft. on the ledge.

Southern Lone Star Gold Mining Co.—This company has sent machinery and material for a cyanide plant to its desert mines, 60 miles from Barstow. Superintendent B. H. Shepley will at once put the property in a condition for working.

SAN DIEGO COUNTY.

Owens.—This mine in the Julian district, which has been closed for several months, is to be reopened and operated on a larger scale by Mr. Large, the owner. In this district M. Jacoby is building a ditch and tunnel to supply water for operating a placer mine near Wynola.

SHASTA COUNTY.

Clover Creek.—W. A. Albertson, superintendent for the Clover Creek Quicksilver Mining Co., which recently bonded this quicksilver mine near Millville, reports a new 10-ft. body of high-grade ore at a depth of 60 ft. There is a wide vein and extensive croppings. A new hoist is being installed.

Clipper.—After several years' litigation, now ended, this long-idle group of gold claims will be reopened and extensively developed, according to J. M. Barron. The property is located near Kennet and near the Mammoth copper mine. The idle 10-stamp mill may be made a 40-stamp mill.

Gladstone.—This old mine at French gulch is now yielding an output of about $23,000 per month, according to report credited to I. O. Jillson, managing owner.

Mt. Shasta.—It is reported that this mine, formerly belonging to the Mount Shasta Gold Mines Corp., has now passed, with the other properties of the corporation, to the Phoenix Gold Mining Co., according to recent report. The latter company has increased its capital stock from $1,500,000 to $25,750,000, with shares at $1 each. The McClure group of copper claims in the Shasta county copper belt is included in the properties involved.

Mammoth.—It is reported that the Boston syndicate, which has secured this property, is to erect a smelting plant at a cost of more than $500,000. This property is one of the most noted groups of claims on the copper belt and its future has been the subject of much speculation for years.

Reid.—At this mine in Old Diggings the 1000-ft. tunnel is being extended. Messrs. Hunt & Sallee are developing under a bond.

SISKIYOU COUNTY.

Advance.—In this mine on Russain creek high-grade ore has been struck on the 70-ft. level. A. C. Brokaw is superintendent.

Gold Dike Mining & Milling Co.—This company, which recently secured some claims on the Salmon river, expects to install a small milling plant at Summerville.

TUOLUMNE COUNTY.

Jumper.—At this and the Golden Rule mine at Stent, belonging to the Jumper Gold Syndicate, development is being pushed in anticipation of extensive productive operations when the fall rains give a water supply. Mark B. Kerr is superintendent.

New Albany.—A valuable strike of high-grade ore is reported fom this mine near Carters on the East belt.

Republican.—The mill at this mine is closed down for lack of water. M. D. Kelly is superintendent.

COLORADO.

BOULDER COUNTY.

Livingstone.—Suit for $50,000 has been brought against W. R. Dotey, owner of this mine at Boulder, by J. C. McCormack, for alleged breach of contract in selling the mine.

CHAFFEE COUNTY.

Mary Murphy.—Operations at this mine, near Romley, have been suspended indefinitely.

Roller-Le Fevre.—This group of 32 claims in the Monarch mining distict, 20 miles northwest of Salida, has been sold to the Three Republics Co., of Pittsburg, Pa., for a stated price of $200,000.

CLEAR CREEK COUNTY.

Arapahoe.—A good strike is reported on this property, owned by Cunningham & Hoffman, in the East Argentine district, near Georgetown.

Big Forty Mining Co.—The tunnel on this company's property, on Chicago creek, near Georgetown, is being run at the rate of 100 ft. per month.

Conqueror.—Work has been resumed in this mine near Empire.

CUSTER COUNTY.

Evening Star.—It is reported that high-grade ore is being taken from this mine at Querida.

Hessite Gold Mining Co.—A dike of conglomerates similar to the Bassick conglomerates is reported encountered on this company's property at Querida. Myron Olin is general manager.

DOLORES COUNTY.

Emma Gold Mining Co.—This company is doing considerable development work on its property at Dunton.

San Juan Ore Co.—This company has added magnetic separators to its mill at the Pro Patria mine at Rico. R. Seyman, Jr., is manager.

FREMONT COUNTY.

Lobach Oil Co.—This company, at Florence, has purchased a complete drilling outfit and will begin operations at once.

GUNNISON COUNTY.

Independence.—It is reported that this mine at Bowerman has been sold to A. E. Reynolds for $75,000. A mill will be erected at once.

JEFFERSON COUNTY.

Independent Smelting & Refining Co.—This company's smelter at Golden has been blown in. All ores except lead will be handled.

Lakeview.—A 100-h.p. boiler, 10-drill compressor and electric light plant have been purchased for this property in the Tin Cup district.

Pompeii.—A good strike is reported on this property, between Pitkin and Ohio City, owned by George Adams.

LAKE COUNTY—LEADVILLE.

Reindeer.—A press despatch reports an important strike on this property, on Rock hill, owned by John F. and George Campion. A body of lead carbonate ore that measures 150 ft. through has been uncovered for a distance of 1,100 ft. The ore is being shipped to local smelters without sorting, and is said to net $20 a ton.

(*From Our Special Correspondent.*)

Aetna.—At this mine, adjoining the old Carbonate to the west, a fair body of ore has been opened in the old workings. It is a hard carbonate carrying considerable chlorides, and is a continuation of the Carbonate shoot.

Bessie Wilgus.—A contract has been let on this property, on Rock hill, to sink the shaft 400 ft., and work has been started.

Big Four.—From the Castle View shaft, a little over 1,200 tons a month of oxide and sulphide ore is being shipped.

Bon Air.—Steady shipments are going out from this property, as well as from the Wood Fraction, which is worked through this shaft. The chloride ore in both claims is very rich and is sacked and shipped separately.

Coronado.—A station is being cut at the bottom of the shaft, and when completed drifting will be started. In the last few feet of sinking a heavy flow of water was encountered.

Chrysolite.—A fair tonnage of manganese ore is being shipped from this property. As the steel plant at Pueblo increases its output the demand for manganese ore from this camp will become greater.

London.—At this mine, Mosquito range, connections have been made from the breast of the South London tunnel with the workings of the North London, by an upraise a distance of 300 ft. The upraise opened a body of fair grade ore.

Rattling Jack.—Some rich ore is being shipped from this claim, which adjoins the Little Johnny. Development work is being pushed.

Onyx.—Shipments continue to go out from this claim, on French mountain, and the values hold up to five oz. per ton. Some of the ore went as high as 12 oz. gold per ton.

Yak Tunnel.—All of the preparatory work of installing the electric plant is completed and the electric engine has been shipped. Work is being rushed on the concentrating mill and good headway is being made.

OURAY COUNTY.

Angel Gold Mining Co.—A good strike is reported on this company's property, four miles from Ouray.

Waldron.—The machinery from the London mine is being removed to this property at Ouray.

Humbolt.—It is reported that operations will be resumed at this old mine near Ouray.

SAN JUAN COUNTY.

Galty Boy.—This group of seven claims, at Silverton, has been sold to Timothy Ross and associates of Waynesburg, Pa., for a reported price of $40,000.

Silver Ledge.—Forty tons of concentrates are being shipped daily from the mill of this mine at Silverton.

SUMMIT COUNTY.

Jessie.—The 40-stamp and concentration mill on this group at Breckenridge has been put in repair, and is now ready for operation.

Reliance Gold Dredging Co.—A powerful Bucyrus dredge boat is being constructed for this company for operation on its property at Breckrenridge.

TELLER COUNTY—CRIPPLE CREEK.

(*From Our Special Correspondent.*)

American Eagle.—It is reported that a rich strike of ore has been made in a winze below the 1,500-ft. level of this property. This is one of the properties of the Stratton estate and is situated on Bull hill. It is one of the deepest mines in the district.

Cripple Creek Enterprise Gold Mining Co.—Mr. Dan Hanley, formerly manager of this company, has sold his interest to the other directors. It is reported that the property will soon be working again. It is situated in the town of Cripple Creek, the company having a lease on the streets and alleys in the city.

Granite Gold Mining Co.—The large new compressor has been installed on this property and other improvements have been made. The property is now in shape to do a large amount of work. Heretofore the company has been getting its air from other properties.

W. P. H.—Considerable ore is being shipped from the Harrison & Seaver lease on this property. Though the ore is not of such richness as that discovered in January, it is of a very good grade and the lessees are making money.

IDAHO.

ADA COUNTY.

McCarthy.—A good strike is reported on this property in Shaw mountain, near Boise.

BLAINE COUNTY.

Dollarhide.—A lease and bond on this group at Harley have been given for two years to C. C. Ruthrauff, of New York.

BOISE COUNTY.

Buena Vista.—Drifting to a depth of 400 ft. has been done on this property at Pearl. Captain W. H. Yankee is manager.

CANYON COUNTY.

Thunder Mountain Gold & Silver Mining and Milling Co.—This company's 10-stamp mill during the month of August crushed 9,200 tons of ore. The average battery sample was $15.74 and the average assay value of the tailings $2.31, making an average according to the assays of 84.4 per cent.

IDAHO COUNTY.

Dewey.—This mine at Hump has been sold to the Central Hump Buffalo Co. for a stated price of $11,000.

KOOTENAI COUNTY

Hogan.—A small cyanide plant will be installed on this property between Elk City and Hump. G. L. Hedges is manager.

Lone Star.—This group, 20 miles north of Hump, has been purchased by George L. Hedges.

Panhandle Smelting and Refining Co.—Work is progressing on the smelter of this company which is being erected at Ponderay, near Sandpoint.

SHOSHONE COUNTY.

Big Divide Mining Co., Ltd.—This company has purchased from Alexander Murphy and other nine claims and three fractions in the Lalande mining district.

Frisco, Bernice and Flynn.—A consolidation of these properties in the Coeur d'Alenes is reported. A company with a capital of $1,500,000 has been formed.

Monarch Mining Co.—The federal court has granted an injunction restraining this company, near Murray, from extracting any more ores. The bond on the property expired January 25, but the payment due was not forthcoming, nor has it since been paid. Mrs. Elizabeth Darling applied for the injunction.

Reno-Idaho.—A consolidation of these 10 claims at Burke has been effected. The principal owners are Thomas Ryan and Charles Eckle.

WASHINGTON COUNTY.

Ladd Metals Co.—The new smelting plant of this company at Landore has been blown in. It has a daily capacity of 75 tons.

INDIANA.

MARION COUNTY.

(*From Our Special Correspondent.*)

Oil Production.—According to the annual report of the State Geologist, the output of Indiana oil for the year 1903 was 9,177,722 bbl., which at the average price of $1.15 per bbl. brought $10,476,469.

Revenue Mining Co.—This company has been incorporated with a capital stock of $25,000. The principal business office will be in Indianapolis and the principal place of operation in the State of Oregon. Edgar H. Johnson, T. W. Overman and William Mendanhall are the directors.

KANSAS.

MONTGOMERY COUNTY.

Panama Oil Co.—This company has purchased a lease on 240 acres of land on the James farm at Wayside for a reported consideration of $30,000.

LOUISIANA.

CALCASIEU PARISH.

(*From Our Special Correspondent.*)

Jennings.—It is reported that the Calcasieu & Houston Oil Co. has succeeded in bringing in their No. 2 well on the J. A. Foster farm near Starke. The Morse Oil Co. has sold the Southern Pacific Railway Co. 100,000 bbl. of oil—40,000 for immediate delivery. A fire in the tanks of the company resulted in damage, amounting to $50,000.

MISSOURI.

BATES COUNTY.

Rich Hill.—The zinc smelters at this place have closed down indefinitely, throwing 100 men out of employment. High price of ore and the shortage of men are given as the cause.

JASPER COUNTY.

Rice Mining Co.—This company has sold its mine and mill, on the Creller & Young land at Joplin, for a reported price of $20,000.

MONTANA.

(*From Our Special Correspondent.*)

Assay Office Receipts.—Receipts of gold and silver from Montana at the United States assay office at Helena for August show an increase of $27,188.53 over the same period a year ago. The entire receipts, including those from other states, show an increase for the month of $5,292.94. The total receipts at the assay office during August were $263,238.45, against $257,945.51 for August, 1903. The receipts from Montana last month amounted to $239,326.79, compared with $212,138.26 last year.

BROADWATER COUNTY.

H. & H.—The work of unwatering this mine near Winston is progressing, but the accumulation of water is so great in the old stopes and levels that it is estimated that two weeks more work will be required to unwater the mine.

CASCADE COUNTY.

(*From Our Special Correspondent.*)

Bannantyne Ranch.—A strong flow of gas has been encountered at this place, 32 miles from Great Falls, on the Teton river. Drilling is now going on through what is pronounced an oil shale, smelling strongly of petroleum. The land is being filed upon by prospectors.

CHOUTEAU COUNTY.

Havre.—It is reported that a rich vein of coal has been discovered near this town, just across Milk river.

DEER LODGE COUNTY.

(*From Our Special Correspondent.*)

Blue-Eyed Nellie.—A good strike is reported at this hill near Anaconda. The property is owned by Nicholas Walters.

French Gulch Dredging Co.—The creditors of this company have caused the Risdon dredge, which has operated on the ground for the past three seasons, to be sold at sheriff's sale. It was bid in by the judgment creditor, the Daly estate.

Montana.—The development work at this property near Georgetown, owned by Sheehan, Gafferty & Rafferty, has reached the stage where continuous ore shipments can be made to the Washoe works. The ore is an iron oxide with a fair assay value in gold.

Moose Lake District.—Prospectors from this region, 40 miles west of Anaconda, are reporting new mineral finds in a number of claims. The ore appears to be either copper or gold. Several gold strikes are reported.

FERGUS COUNTY.

Barnes-King Mining Co.—This company is said to have sent to the assay office $232,000 in gold, the result of the cyanide plant for 30 days.

Kendall Mining Co.—This company has declared its regular monthly dividend of 5 cents per share, calling for the payment of $25,000 to stockholders. The mine has now paid in dividends a sum equal to that paid for the property by Finch & Campbell, the principal owners—$460,000.

JEFFERSON COUNTY.

(*From Our Special Correspondent.*)

Mitchell Gulch Placers.—D. C. Turner, who has been operating a hydraulic on the upper part of the gulch for 20 years, has given an option on his entire holdings to Eastern people, who will prospect the ground with a view to placing a bucket dredge thereon to take the place of the Marion steam shovel, which was used on the ground some years ago, but which was not a success.

LEWIS AND CLARKE COUNTY.

Wunderlin-Draper.—A good strike is reported on this property near Iron Siding.

Jay Gould.—The mill at this mine, north of Helena, is running steadily on ore from the mine.

Montana Co., Ltd.—It is reported that this company will build a large plant in Poorman gulch.

MISSOULA COUNTY.

Heverin-Houle Mining Co.—Extensive developments are contemplated on this company's properties in Clinton and Bearmouth.

Penmont Consolidated Mining Co.—This company has purchased placer ground near Nine Mile from J. W. Coolidge, and a group of quartz and placer claims at the same place. The group includes the Dayton, Democrat, King Solomon, Barrett, Annie Quartz and Artemisia quartz claims and the Boulder, a placer property. The company also has purchased a two-thirds interest in the O. K. quartz lode claim, and others situated in the Lolo mining district.

PARK COUNTY.

Kimberley-Montana Mining Co.—It is reported that operations will soon be resumed at this company's mines and mills within a short time.

POWELL COUNTY.

Sure Thing.—The shaft in this mine, at Elliston, is now down 400 ft. At the 600 ft. level a crosscut will be run to the vein.

SILVERBOW COUNTY.

Pennsylvania.—Work has been resumed at this mine in Butte after an idleness of five weeks on account of necessary repairs to the shaft.

SWEETGRASS COUNTY.

Boulder Mining and Milling Co.—A 5-stamp mill will be installed in this company's property at Big Timber.

NEVADA.

EUREKA COUNTY.

Lincoln Mining Co.—This company will install a concentrator on its property, about 18 miles north of Eureka. An Overstrom table will be used.

HUMBOLT COUNTY.

Rose Valley Boxax Co.—C. S. Oilgard has secured a half interest in this company's property at Winnemucca.

LINCOLN COUNTY.

Cyrus Noble.—The Duplex mill has been leased for treating the ores from this mine at Searchlight.

Quartette.—A good strike is reported on this company's property at Searchlight.

STOREY COUNTY.

Golden Gate Milling and Mining Co.—This company in the Virginia district has brought suit against the Ophir Silver Mining Co. for an alleged jumping of its claim, and removing therefrom $400,000 worth of ore.

NEW MEXICO.

COLFAX COUNTY.

Deep Tunnel Mining & Mill Co.—The shaft on this company's property at Elizabethtown is down 800 ft.

DONA ANA COUNTY.

Gold Camp.—A large concentrator is to be built at this mine in the Organs.

GRANT COUNTY.

Colorado Fuel & Iron Co.—This company has resumed operations at its iron mines at Ferro.

Mountain Key.—A half-interest in this mine at Pinos Altos has been purchased by T. C. McDermott. Work will be begun at once.

LINCOLN COUNTY.

Jicarilla Mining & Milling Co.—A mill is to be erected by this company at Jicarilla to treat the ores of the camp and the surrounding country.

RIO ARRIBA COUNTY.

Jaw Bone Development Co.—This company has installed a diamond drill on its property in Bromide.

Strawberry.—Work has been resumed at this mine at Bromide.

SANTA FE COUNTY.

Racine Mining & Smelting Co.—This company at Golden is drilling for water for its dredge and washer.

SIERRA COUNTY.

Monument.—A Little Wonder Hardsocg drill is being installed at this mine near Fairview.

Snake.—The shaft on this mine at Hillsboro has been repaired to the 180-ft. level.

Treasure.—A good strike is reported at this mine at Hillsboro.

SOCORRO COUNTY.

Graphic and Kelly.—Considerable damage was done at these mines at Magdalena and Kelly by recent floods.

OREGON.

BAKER COUNTY.

Alamo.—A 30-ton cyanide plant is to be installed at this mine near Sumpter.

Blue Bird.—The 100-ton concentrating plant at this mine near Baker City is to be supplemented by a stamp mill for the free milling ores.

Eagle-Consolidated.—A lease and bond have been taken on this group in the Cable Cove district by McEwen, Arthur & McEwen.

Emma.—The 10-stamp mill at this mine, 6 miles east of Baker City, is now in operation.

Overland.—Ore is being sacked from the mine to the smelter at Sumpter.

Virtue.—The hoisting plant at this mine near Baker City is in operation, and work has been resumed in the 3-compartment shaft.

Willie Boy-Cleveland.—A strike is reported on the 275-ft. level of this mine at Sumpter.

DOUGLAS COUNTY.

Umpqua Coal Co.—This company has been incorporated to develop and operate the coal mines between Elkton and Kellogg, on the Umpqua river, where a 9-ft. vein of coal was recently opened.

GRANT COUNTY.

Big Producer Mining Co.—A hoisting plant is to be installed at this company's property in the Alamo district.

May Queen.—The 10-stamp mill at this mine at Granite is now in operation. W. T. Young is manager.

Red Boy.—A new company has been organized with a capital of $1,000,000 to take over this property near Baker City. The officers and directors are as follows: Ray Nye, Fremont, Neb., president; John G. English, Danville, Ill., vice-president; R. P. Schneider, Fremont, Neb., treasurer; Alexander Prussing, Chicago, secretary, and J. O. Milligant, Wakefield, Neb.; E. J. Godfrey, Portland, Ore., and John Thomsen, Baker City, Ore., directors.

JACKSON COUNTY.

Opp.—This mine, near Jacksonville, has been bonded to Dr. J. F. Reddy, of Spokane, for a reported price of $150,000.

JOSEPHINE COUNTY.

Albright.—These quartz mines near Kerby have been bonded to T. F. Hopkins & Co. for a reported price of $20,000.

Sucker Creek Mining Co.—This company, in the Sucker Creek district, is doing placer mining by pumping and hoisting.

Takilma.—The smelter at this place is now in operation. Chas. L. Tutt is general manager.

PENNSYLVANIA.

ANTHRACITE COAL.

Coxe Bros. & Co., Ltd.—This company has leased from the heirs of the late Eckley B. Coxe all their properties in Schuylkill, Northumberland, Luzerne and Carbon counties. The lessees will pay a royalty of 40c. a ton on all coal larger than pea.

Black Diamond Coal Co.—This company's breaker at Llewlyn has been completed. It has a capacity of 1,500 tons daily.

Philadelphia & Reading Coal & Iron Co.—This company will build a large breaker and open up a new colliery west of Bear valley, near Shamokin.

Lehigh & Wilkesbarre Coal Co.—This company will build a new breaker at Audenried in place of the old structure recently destroyed by fire.

BITUMINOUS COAL.

Briquette Fuel Co.—This company will erect a plant in Pittsburg for the manufacture of briquettes from the waste materials from the mines.

Jenner-Quemahoning Coal Co.—This company is reported to have purchased 3,000 acres of coal lands in Somerset county.

TEXAS.

HARDIN COUNTY.

(*From Our Special Correspondent.*)

Sour Lake.—W. E. Brice has a new well on the south side which is flowing 500 bbl. daily.

Batson.—This field is producing about 80% of the South Texas crude, although none of the wells are now gushing and few of them yield 500 bbl. daily. Crude is firm at $40. The large buyers and consumers of crude loaded up with oil some months ago and are not buying heavily. This appears to be the only reason for the low price of oil, for the reduction has fallen off 50%, and there is no prospect of an increased supply from any new field for several months.

JEFFERSON COUNTY.

(*From Our Special Correspondent.*)

Port Arthur.—It is stated that the Johnson Bayou Oil & Mineral Co. has succeeded in bringing in a well good for 50 bbl. daily.

NACOGDOCHES COUNTY.

(*From Our Special Correspondent.*)

Nacogdoches.—The Nacogdoches Oil & Development Co. has bought a drilling rig and intends sinking several wells south of Oil Springs.

WILSON COUNTY.

(*From Our Special Correspondent.*)

Sutherland Springs.—The Sutherland Oil Co. is drilling a well near here. It is down 200 feet.

UTAH.

BEAVER COUNTY.

Cactus.—At this mine of the Newhouse Mines and Smelters Corp. machinery is arriving daily.

Majestic.—It is reported that the claims against this mine are being satisfactorily adjusted.

BOX ELDER COUNTY.

Bonneville Oil and Asphaltum Co.—This company has been incorporated with a capital of $100,000. The officers are Simon Bamberger, president; J. S. Gordon of Ogden, vice-president; E. B. Critchlow, treasurer; and E. A. Vail, secretary; directors, George Frary, Lakeside; George Payne, Syracuse; H. M. McCartney, Salt Lake City; M. J. West, Thomas E. Black and U. V. Withee, Ogden; James Simpson, J. J. Simpson and Thomas Hull Hooper. The company owns the Eva, New Century, Industrial, Big Muddy and Old Original consolidated placer claims in this county.

Century.—During the last half of August a gold bar worth $3,500 is said to have been obtained from the ore of this mine.

JUAB COUNTY.

(*From Our Special Correspondent.*)

Tintic Ore Shipments.—Shipments for the week ending September 17 aggregated 99 carloads, as follows: Ajax, 3; Bullion-Beck, 5; Centennial-Eureka, 33; Eagle and Blue Bell, 5; Eureka-Hill (concentrates), 4; Gemini, 17; Grand Central, 3; Godiva, 9; Mammoth, 4; Lower Mammoth, 1; Star Consolidated, 3; Osborne, 1; Uncle Sam Consolidated (concentrates), 3; Yankee Consolidated, 8.

Tetro.—At the annual meeting of this company the old board of directors was retained, as follows: James A. Pollock, president; C. H. McMahon, vice-president; Ernest Williams, secretary and treasurer; all of Salt Lake City. The total receipts since its organization, in 1898, including $70,261 from assessments and $63,351 from the sale of ore, were $135,677. The disbursements during the same period were $107,875.60. The company has paid $9,000 in dividends during the year, and has a cash balance of $27,802.23 on hand.

SALT LAKE COUNTY.

(*From Our Special Corresponaent.*)

Bingham Consolidated Smelter.—Copper bullion shipments from this plant during the week ending September 17 aggregated 243,626 pounds.

Utah Consolidated Smelter.—Shipments of copper bullion from this plant during the week aggregated 361,986 pounds.

United States Smelter.—The copper bullion shipments from this plant during the week ending September 17 aggregated 250,981 pounds.

SUMMIT COUNTY.

(*From Our Special Correspondent.*)

New York Bonanza.—At the annual stockholders' meeting a new board of directors was chosen, as follows: M. J. McGill, S. W. Platt, and Julius Frankel, of Park City, and A. J. Shores, of Salt Lake City. The old board and management were retired. The company has an indebtedness of about $2,500, with less than $100 in the treasury.

TOOELE COUNTY.

(*From Our Special Correspondent.*)

Overland.—The mill at this property is in

operation, and a shipment of cyanides, the first in several years, has been made.

Stockton.—Work is progressing favorably with the construction of the new mill at this property. It will have a capacity of 75 tons per day.

WASHINGTON.

FERRY COUNTY.

Cascade Consolidated Mining and Smelter Co.—This company at Chelan is running a large tunnel for about 700 ft. to tap the Doubtful Lake ledges.

Copper Key.—This mine at Republic is preparing to make shipments on an extensive scale. Robert Angus is superintendent.

Easter Sunday.—This mine at Orient will resume operations this month.

OKANOGAN COUNTY.

Ben Harrison Mining Co.—A 30-ton mill has been purchased for this company's property at Chesaw. J. P. Blaine is superintendent.

Interstate Mining Co.—The concentrator on this company's property south of Chesaw has been put in operation.

SNOHOMISH COUNTY

Sullivan.—The smelter at this mine near Marysville has been entirely remodeled. It is the intention of the company to establish next spring not only a refinery, but also corroding works for the manufacture of white lead and a lead pipe factory.

WHATCOM COUNTY.

Great Excelsior Mining Co.—This company's new plant at Bellingham has begun operations.

FOREIGN MINING NEWS.

CANADA.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Boundary Ore Shipments.—Shipments for the week ending September 10 were as follows, in tons: Granby, 10,440; Mother Lode, 3,968; Emma, 1,507; Mountain Rose, 66. Total for the week, 15,981 tons; total for year to date, 550,700 tons.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

Rossland Ore Shipments.—Shipments for the week ending September 10 were as follows, in tons: Le Roi, 2,350; Centre Star, 1,680; War Eagle, 1,070; Le Roi No. 2, 380; same, milled, 300; Jumbo, 200; Cliff, 75; Velvet-Portland, milled, 250; White Bear, 400. Total, 6,705 tons; total for year to date, 245,708 tons.

MEXICO.

MICHOACAN.

Compania Explotadora de Carbon de Michoacan.—This company, which owns coal fields in the vicinity of the town of Agostitlan, proposes to construct a railway from the mines to Irimbo, a distance of about 35 miles, and will probably extend the line from the latter point to connect with the Mexican Central railroad at San Juan del Rio.

MINING STOCKS.

(Full quotations on pages 495 and 496.)

New York. Sept. 21.

In mining shares, especially copper, business has improved, partly as a result of better metal prices. Amalgamated has touched $59.50, on larger trading, and Anaconda $22.00. Greene Consolidated, of Mexico, sold at $15.375@$15.50. Tennessee continues to strengthen, rising to $32.50 this week on moderate transactions. White Knob, of Idaho, is quiet, fluctuating between $4.75 and $3.75.

Gold and silver shares attracted little attention and sold at small variations in price.

Boston. Sept. 20.

(*From Our Special Correspondent.*)

Notwithstanding the advance in the price for copper there is an antipathy in mining shares. The only event of importance is the announcement made last week that the United States Mining Co. had increased its stock issue by 60,000 shares to take over the Mammoth group of mines in Shasta County, Cal.

The United States will exchange its stock, share for share, for Mammoth, and 31,250 shares of the former will be offered stockholders of record September 20 at $20 per share, one new for eight held. The issue is underwritten by inside interests. It seems that certain United States Mining directors purchased this property several months since, and as such were in the minority in voting to take it over by the United States Co. Quite a storm has arisen and several explanations have been made as a result. This action has hurt the stock in a way, and was the direct cause for the break to $19.75.

Utah Consolidated has been persistently pressed for sale, and is off $2.75 for the week to $39. No particular explanation is given except that a bear crowd is working in the stock. Copper Range worked up $1, to $59.37½, but slid back to $56.25. The stock is largely manipulated and the majority of people are a trifle afraid to trade in it at present. Osceola, which touched $81, is off to $77.50 to-night, and Wolverine is selling at $87, ex-dividend. Such stocks as Mass, Michigan, Adventure and Victoria are finding favor. Mass sold up to $4.75, Adventure to $2.50, assessment paid, and Victoria to $4.62½. Michigan is steady around $6.50@$6.25. Mohawk has gone off $1.50, to $45; Allouez $2, to $11.50; the latter recovering a fraction, and Centennial $1.75, to $26.25. Isle Royale advanced $2.50, to $19, but subsequently fell back to $17.50. Ahmeek is quoted $2 higher on the curb, at $30.

Colorado Springs. Sept. 16.

(*From Our Special Correspondent.*)

The market started out the first of the week with a fine tone, but ends with lighter trading and prices a shade off.

High grade sylvanite ore is said to have been found on Bull Hill in large quantities below the 1,500-ft. level.

At the beginning of the week El Paso was the feature, reaching its highest point at 96½c., but sold to-day for 95c. Elkton is selling around 64½c. C. K. & N. sold to-day for 27½c. Portland sold yesterday for $1.65. Isabella is now selling for 21c. Work sold to-day for 8¾c.

Salt Lake City. Sept. 17.

(*From Our Special Correspondent.*)

Mining stocks have been dull. There was some business done in Nevada stocks, notably Montana-Tonopah, just prior to the annual meeting of the stockholders. Of the Utah stocks, May Day was most active, due to a number of brokers filling their "shorts." Sacramento has held up firmly notwithstanding the statement of the management that no dividends need be expected for at least two months. A limited amount of Columbus Consolidated was transferred at $1.20@$1.215, but it was hard to get at those figures. Less than 500 shares of Daly-West were transferred. Stock displayed more strength than last week. At the annual meeting of the Tetro Co. the financial statement showed a surplus on hand of over $27,000, and that more than $60,000 worth of ore has been shipped in the past year. No Bingham stocks sold locally.

San Francisco. Sept. 15.

(*From Our Special Correspondent.*)

Prices show some steadiness, though trading is small.

The sworn returns of the mining companies, as filed in their offices this week, show cash on hand Sept. 1 as follows, with all expenses paid unless otherwise noted: Alta, $228, with bills payable of $4,802; Alpha Consolidated, $448; Andes, $5,109; Belcher, $657, with August expenses partly paid; Bullion, $1,559; Caledonia, $9,762, with August expenses at mine unpaid; Consolidated California & Virginia, $169, with debts of $6,000; Confidence, $73, with August expenses at mine unpaid; Crown Point, $2,590, with August expenses partly paid; Consolidated New York, $1,509; Chollar, $5,126; Consolidated Imperial, $2,897; Challenge Consolidated, $3,008; Exchequer, $3,107; Gould & Curry, $6,275, with bills receivable of $390; Hale & Norcross, $1,030; Julia Consolidated, $2,211; Justice, $2,535; Mexican, $3,533; Ophir, $69,604; Overman, $7,959, with August expenses at mine unpaid; Potosi, $4,650; Savage, $1,063; Segregated Belcher & Mides, $2,347; Sierra Nevada, $4,830; Silver Hill, $4,901; Standard Consolidated, $78,091, with August expenses at the mine and bullion clean-up to be accounted for; Syndicate, $2,700; Scorpion, $1,703; Union Consolidated, $3,946; Utah Consolidated, $460, with indebtedness of $1,000.

Monterey. Sept. 14.

(*From Our Special Correspondent.*)

Exchange on New York, though it was at times during the week at ¼ or ½ a point below, opened Monday and closed Saturday at 215.

Mining stocks were most quiet, with some days no sale at all. Of the few reported, La Union, El Oro, brought $30; Guadalupana, S. L. P., $10, and La Paz, Matehuala, S. L. P., $200; Augustias, Pozos, Guanajuato, $32; and in Pachuca Amistad y Concordia, $70, and Soledad, $930.

COAL TRADE REVIEW.

NEW YORK, Sept. 21.

ANTHRACITE.

The anthracite coal trade continues quiet. However, there has been a distinct improvement within the last few days at some inland points, where cooler wheather has stimulated retail buying, and, on the whole, the general tone of the market has been stronger since the 10th of the month. Production is still restricted by the large companies, some of which close all their mines for a few days, while others close mines here and there as suits their convenience. This policy of restriction has rather improved the standing of the small steam sizes. While these are in no better demand, yet, as a large tonnage is sold to manufacturing concerns under contracts requiring steady shipments, and as the proportion made by the breakers is fairly constant, stopping the breakers more directly prevents an accumulation of these sizes than of the prepared sizes. In general, though sales agents still complain of business being dull, the prospects of an improved demand are brighter and the business done during the past summer has seemed light, only in comparison with the abnormal demand in 1901-1903.

At the head of the lakes there is a slight improvement in the demand for coal at inland points, but the movement from the docks is not heavy enough as yet to change the conditions which have prevailed for several weeks. In Chicago territory there has been little change in the market, though retail business is improving, as a result of cool weather. Along the lower lakes and in Canadian territory the situation has changed but little, and wholesale trade is very quiet. Along the Atlantic seaboard dealers report a little more activity from eastern points, but in general the market remains quiet. The New York, New Haven & Hartford railroad continues to try to get consumers to have coal sent all-rail from the mines, and has thus changed considerably the proportion of coal forwarded by barges and schooners. One of the recent announcements in this connection is that the railroad is putting up a trestle at Roxbury that will result in 100,000 tons of coal going all-rail that formerly went by boat and rail.

Returns of prices realized on coal sold at tidewater in August show that the principal companies kept close to the quotations.

BITUMINOUS.

The Atlantic seaboard bituminous trade is still dull, although the tone of the market has improved, and shippers report an increase in the number of orders received. Producers in central Pennsylvania are complaining of the restrictions put upon them by their agreement with the mine workers last spring, and claim that they are not able to pay the mining rates then established and compete with Virginia coal; hence they must shut down their mines until the market improves. These central Pennsylvania producers also complain of the differential against them in railroad freight rates. West Virginia coals are hauled over 400 miles

to tidewater for $1.35, while Pennsylvania producers pay $1.50 on a haul of a little over 300 miles. There have been various meetings among producers recently to discuss the making of higher prices, but no results are reported as yet, though some disposition has been shown to get together.

Trade in the far East is quiet, shipments to that territory being principally on contracts. Some orders are coming from shoal water ports, where ice makes early, but such contracts are now pretty well filled. Along Long Island sound trade is quiet and seems to have been affected badly by through all-rail shipments from the mines, this applying especially to lower sound territory. At New York harbor points the market is dull, but a favorable feature is the apparent restriction on mine shipments that keeps coal from accumulating at tidewater and being sold under demurrage. The all-rail market is active. It is said that prices have been reduced at some points.

Transportation from the mines to tidewater was a little slow early in the week, but is now prompt. Car supply at the mines is up to all demands, being limited only by the dispatch shown in unloading at tidewater. In the coastwise vessel market, the supply of vessels equals the demand, though captains are inclined to be indifferent at chartering at present rates, which are low for this time of the year. We quote current rates from Philadelphia as follows: Boston, Salem, Portland and Bath, 75c.; Providence, New Bedford and Long Island sound, 60c.; Portsmouth, 80c.; Lynn, Newburyport and Bangor, 85c.; Gardiner, 80c. and towages; Saco, 90c. and towages. Rates from New York harbor are 50c. to around Cape Cod.

Birmingham. Sept. 19.

(*From Our Special Correspondent.*)

There is a steady improvement in Alabama coal production as the furnace companies place non-union labor in their mines. During the week the Little Cahaba Coal Co., with mines at Piper, in Bibb county, signed a temporary contract with the United Mine Workers of America, and work has resumed there with 300 men. All but one of the commercial coal operators in Jefferson and Bibb counties of Alabama have signed such temporary contracts with the union miners, and find a ready demand for coal at advanced prices. The furnace companies still claim that they are making good progress in their fight with the union and are bringing in labor from other States. The Sloss-Sheffield Steel & Iron Co., the Tennessee Coal, Iron & Railroad Co., the Woodward Iron Co., and the Lacey-Buek Iron Co. have been able to start up a number of coke ovens owing to increased coal output. How long the strike will last is hard to say. The furnace operators declare that they will never more recognize the union, while the leaders of the union say that the existence of the union is threatened, and the fight is to a finish. The miners at work at the commercial mines each contribute $1 per week to the strike fund, and the national organization is reported to contribute $10,000 per week.

Considerable development is under way in Walker county, and before the end of the year three or four new mines will be in operation.

The coke production is improving. Some West Virginia coke is still imported.

Chicago. Sept. 19.

(*From Our Special Correspondent.*)

Sales of anthracite are somewhat better than two or three weeks ago. The improvement doubtless will not be marked until the advent here of prevailing cold weather. Retailers blame the consumer for his apathy, and say it is no use for them to lay in stocks that will not be sold until the coal is needed. Statistics of receipts by lake in Chicago show that to September 1 only 470,000 tons arrived, against 680,000 tons in the corresponding period of 1903. By rail the receipts of anthracite were 610,000 tons to September 1, against 755,000 tons in 1903. The trade seems confident, however, that there will be no deficit of coal next winter, this feeling apparently being based on confidence in the all-rail routes to supply promptly any needed amount. It is the history of the local trade that cool summers are usually followed by late closing of navigation, and the dock deficit, therefore, may be made up by the time navigation closes.

In the bituminous market eastern coals may be said to be fairly steady and western coals weak. There is no briskness, however, in either eastern or western. As a consequence of the severe competition in Illinois and Indiana coals, there has been a noticeable falling off during the year in the number of firms and dealers in the local wholesale market. The larger local agents now say that shipments of western coal should be restricted, and production curtailed until the market is capable of consuming a greater supply. This, however, seems to demand co-operation by the mine-owners, something that seems improbable.

Quotations for western steam coals are: Lump, $1.70@$2; run-of-mine, $1.30@$1.75; screenings, 80c.@$1.50. Of eastern coals, Hocking is in good demand, and at present the supply is somewhat decreased, owing to lack of cars. It sells for $2.90@$3. Smokeless is stronger and brings $3.50@$4 for lump and egg, and $2.90@$3.15 for run-of-mine. Youghiogheny, at about $2.85, and Pittsburg, at about $2.75, are in light demand.

Cleveland. Sept. 20.

(*From Our Special Correspondent.*)

There is a slight improvement in the demand for coal, but no change in the situation. The improvement depends upon a general quickening of lines of industry, and while such developments are expected there is no concrete development yet. A little better demand for steam coal has not resulted in much advance in prices. The market is a little stiffer. Both Pennsylvania and Ohio coals are selling at 95c.@$1 at the mines for run-of-the-mine. Other grades are scaled on that price. The price of slack is also a little stronger. The quotation now is about 35c.@40c. at the mine, with a good demand. Contracts are being placed at 50c. and upward when long time delivery is exacted.

The domestic coal situation has not changed materially. There is a seasonable demand. The usual September advances have not been made because competition is much stronger than it was in former times, several new fields beginning to ship supplies into this territory.

The lake coal situation is interesting. The upper lake docks have been congested for some time, detaining the boats from 5 to 8 and 10 days. Boat owners are withholding their tonnage, and the railroads are refusing to ship coal as freely to the lakes as they have done, fearing their equipment might be tied up. The coal is moving with considerable freedom nevertheless.

Pittsburg. Sept. 30.

(*From Our Special Correspondent.*)

Coal.—There is little change in the markets. All the railroad mines continue in full operation with one exception. The miners' organization has ordered a strike at the Fredericktown mine of the Clyde Coal Co., an independent concern, owing to a disagreement over the employment of a check weighman. About 150 men are idle. There has been considerable speculation as to the future operation of the properties of the Pittsburg Terminal Railroad & Coal Co. purchased last week by the Wabash Railroad. It was reported that the Pittsburg Coal Co. would lease the coal mines, with the stipulation that all the tonnage would go to the Wabash, but the report was officially denied. The Wabash has just made connection with the West Side Belt Railroad. Prices remain unchanged, run-of-mine being quoted at $1@$1.10 at the mine.

Connellsville Coke.—Both production and shipments show big gains, and the outlook is regarded as bright. The H. C. Frick Coke Co. fired about 1,000 additional ovens during the week. The demand is steadily increasing and prices are firm, furnace coke being quoted at $1.50 and foundry at $1.85@$2. The production last week was 194,761 tons, a gain of nearly 3,000 tons compared with the previous week. The shipments aggregated 10,540 cars, distributed as follows: To Pittsburg and river points, 3,666 cars; to points west of Pittsburg, 5,512 cars; to points east of Everson, 1,362 cars. This was an increase of 779 cars.

Foreign Coal Trade. Sept. 21.

The continued dullness of the seaboard market leads American producers to look sharply for export orders, but there has been little new business reported during the week.

Exports of coal from Great Britain to the United States for the eight months ending August 31 were as follows, in long tons:

	1903.	1904.	Changes.
Atlantic ports	1,046,908	25,696 D.	1,021,212
Pacific ports	63,487	71,293 I.	7,806
Total	1,110,395	96,989 D.	913,406

Trade with the Atlantic coast is again normal; with the Pacific ports it shows a slight increase.

The total exports of fuel from Great Britain for the eight months ending August 31 were as follows, in long tons:

	1903.	1904.	Changes.
Coal	29,743,175	30,548,820 I.	805,645
Coke	419,063	452,110 I.	33,047
Briquettes	629,128	858,529 I.	229,401
Total	30,791,366	31,859,459 I.	1,068,093

In addition to these exports there were sent abroad for the use of steamers in foreign trade 10,939,195 long tons in 1903, and 11,303,792 tons in 1904, an increase of 364,597 tons.

Messrs. Hull, Blyth & Co., of London and Cardiff, under date of September 10, report that there is no change to report in the condition of the Welsh coal market, which remains very dull throughout. Quotations are: Best Welsh steam coal, $3.60; seconds, $3.48; thirds, $3.30; dry coals, $3.30; best Monmouthshire, $3.24; seconds, $3.18; best small steam coal, $2.10; seconds, $1.80; other sorts, $1.68.

The above prices for Cardiff coal are all f. o. b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f. o. b. Newport, both exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2.5% discount.

The outward freight market continues quiet and unchanged. Some rates are: Marseilles, $1.20; Genoa, $1.08; Naples, $1.08; Las Palmas, $1.32; St. Vincent, $1.44; Rio, $2.04; Santos, $2.46; Buenos Ayres, $1.68.

IRON TRADE REVIEW.

NEW YORK, Sept. 21.

In the iron and steel trades, particularly in the pig iron market, sales agents are more optimistic than they have been. Buying has not increased much, but inquiries are more numerous, and an improved demand is expected. The prices of bessemer and open-hearth billets and sheet bars have been cut, the cut being greatest at Pittsburg, where the new price of billets is $19.50. At other points the cut is not as great, owing to the rail freight from Pittsburg being added to the new basis. On the whole, while it does not appear that prices of all finished material have reached bottom, yet the outlook is distinctly more encouraging. The Lake Superior ore market continues quiet. It is reported that some producers are shipping to lower lake docks in excess of present demands, expecting to see a decided increase in the needs of furnaces during the winter.

British Iron Trade.—Exports of iron and steel and of machinery from Great Britain for the eight months ending August 31 are valued by the Board of Trade returns as follows:

	1903.	1904.	Changes.
Iron and steel	£20,892,916	£18,687,888 D.	£2,205,028
Machinery	12,908,686	13,758,218 I.	849,532
New ships	3,155,103	2,918,428 D.	136,675
Total	£36,956,705	£35,364,534 D.	£1,592,171

The chief items of the iron and steel exports were, in long tons:

	1903.	1904.	Changes.
Pig iron	770,601	554,862 D.	215,739
Steel ingots, etc	98,892	76,449 D.	22,443
Bars, etc	82,268	76,479 D.	5,789
Rails	437,146	346,661 D.	90,485
Sheets	235,245	250,885 I.	15,640
Tin plates	196,231	229,725 I.	33,494

Imports of iron ore for the eight months were 4,458,441 tons in 1903 and 4,100,750 tons in 1904, a decrease of 357,691 tons. Of this ore, 3,107,574 tons came from Spain, as compared with 3,481,834 tons in 1903.

Birmingham. Sept. 19.

(*From Our Special Correspondent.*)

The pig iron market in this district during the past week has been quiet and quotations

are not as firm. No. 2 foundry is being sold by some manufacturers at $9.25 per ton, though the larger furnace companies are trying to maintain the $9.50 rate. Shipments are steady. The sales at $9.25 per ton are attributed to competition of northern furnaces. Production is holding its own. Through an accident one of the Ensley furnaces, belonging to the Tennessee Coal, Iron & Railroad Co., was put out of commission, but the damage is being repaired rapidly. The Sloss-Sheffield Steel & Iron Co. is getting fine results from its five furnaces in blast, the average being about 197 tons per day, of which more than 65 per cent is of the better grades, and 90 per cent of the whole is foundry grade. The new furnace of the Lookout Mountain Iron Co., at Battelle, is doing fairly well.

The following quotations are given: No. 1 foundry, $9.50@$10; No. 2, $9.25@$9.50 No. 3, $8.75@$9.25; No. 4 foundry, $8.50@$8.75 per ton; gray forge, $8@$8.50; No. 1 soft, $9.50@$10; No. 2 soft, $9.25@$9.50.

There is still a ready demand for cast iron pipe, and good prices obtain. The United States Cast Iron Pipe Co. and the Dimmick Pipe Co. have submitted bids on the order to be let shortly by the Isthmian Canal Commission for piping for the water works system at Panama. No change is reported at the rolling mills. The Tennessee Coal, Iron & Railroad Co. has three departments of its Bessemer rolling mills in operation with non-union labor.

Chicago. Sept. 19.

(From Our Special Correspondent.)

The condition of the pig iron market continues encouraging; sales in the last week have been better and prices are firmly maintained. The buying is chiefly on short time, but lots are larger, several being reported for 1,500 to 2,500 tons. The leading agents of both southern and northern are bullish in tone and predict higher prices by November. Selling agents show a tendency to hold off on contracts extending into 1905; this is ascribed to the belief in an advancing market.

An increase in general sales of finished products in Chicago territory has been reflected in the iron market, and to all appearances will continue throughout this coming week. The despondency and pessimism shown by sellers a few weeks ago have disappeared. All signs are encouraging.

Quotations are about as last week—$9.50@$9.75, Birmingham, or $13.15@$13.40, Chicago, for southern No. 2, and $13.25@$13.75 for northern No. 2. Coke is in steady, though not heavy, demand at $4.65, minimum, for Connellsville, and apparently will continue firm.

Cleveland. Sept. 20.

(From Our Special Correspondent.)

Iron Ore.—The buying movement is still delayed. There are suggestions now that some of the shippers, anticipating a shortage of ore among the furnacemen before spring, are shipping in excess of sales, and will let the ore remain on the docks until sold. Prices have not changed, and the movement of ore down the lakes has not increased. The market holds about steady both as to price and freight rates. Prices are: $3.25 for bessemer old range; $3 for bessemer Mesabi; $2.60@$2.75 for non-bessemer old range, and $2.40@$2.50 for non-bessemer Mesabi. The rates of carriage are 65c. from Duluth; 60c. from Marquette, and 50c. from Escanaba.

Pig Iron.—Buying of foundry iron seems to have stopped for the time being. Sellers are holding firmly to the new prices, while the buyers are resting on what they have already purchased, and do not care to make further commitments until they have been satisfied that present prices are justifiable. The market is firm at $12 in the Valleys for No. 2, with southern iron quoted at $9.50 Birmingham for No. 2. There is very little demand for either bessemer or basic, and the expected buying movement has not appeared. Prices are largely nominal.

Finished Material.—The announcement that bars have been dropped all around $1 a ton, with the exception of Crescents, found this market unprepared for such development, so it is hardly expected there will be any buying of material which was held over. The reduction puts bessemer steel bars at 1.30c. Pittsburg, with open hearth at 1.40c. Pittsburg. The market for bar iron was not affected, as competition had brought the average quotation down to 1.25c. at the mill.

New ships are being built or are about to be ordered, and some good plate contracts have been closed since the cut in quotations. The price holds now at 1.40c. Pittsburg for the basis. It is said that the re-affirmation of the rail prices caused some good buying by traction companies. One order recently placed was of 7,000 tons, which will go into a new line. Other traction properties have covered for some new extensions planned. The sheet trade is still rather quiet; prices have not been changed, and the buying, while apparently slightly increased, seems to be merely switching from the smaller to the larger mills to get the specifications demanded.

Old Material.—The slightly better demand has brought out a flood of material, which keeps down prices.

New York. Sept. 21.

Pig Iron.—The local market again shows a little increase in inquiries and orders. For northern iron we quote: No. 1X foundry, $14.75@$15; No. 2X, $14@$14.25; forge, $13@$13.25. For southern iron on dock prices are about as follows: No. 1 foundry, $13.50; No. 2, $13@$13.25; No. 3, $12.75@$13; forge, $12.25@$12.50.

Plate.—The recent cut in prices has had little effect on demand. We quote 1.545c. for ¼-in. tank plate in carloads at tidewater, with other grades in proportion.

Steel Rails.—Quotations remain $28 for standard sections, f. o. b. mills. Quotations for light rails range from $21 for 40-lb. up to $24 for 12-lb., f. o. b. mills in large lots.

Structural Material.—A few good-sized contracts have been closed recently, but the market has not improved materially. We quote on large lots at tidewater, 1.55@1.80c. for beams, angles and channels.

Pittsburg. Sept. 20.

(From Our Special Correspondent.)

The frequently deferred meeting of the steel billet pool was held here yesterday, and a general revision in prices of billets and sheet bars was made. The cut is not as heavy as had been expected and is greater for Pittsburg consumers. The new price for bessemer and open hearth billets is $19.50 f.o.b. Pittsburg, with freight added to destination; sheet bars are $2 a ton higher, the differential having been increased from $1. Under the old agreement the shipper assumed part of the freight. The old price in Pittsburg was $23; Chicago, $24; Philadelphia, $24.25; New York, $24.75, and Cleveland, $23.50. Under the new agreement the straight freight rate is added to the Pittsburg price to these points, as follows: Chicago, $3; Cleveland, $1.40; Philadelphia, $2.40, and New York, $2.60, making the new rates: Chicago, $22.50, a cut of $1.50; Cleveland, $20.90, cut of $2.60; Philadelphia, $21.90, cut of $2.35; New York, $22.10, cut of $2.65. The new price of sheet bars is $2 a ton higher than the above prices for billets. The steel bar pool met immediately after the billet meeting and cut prices $1 per ton, making bessemer steel bars 1.30c. instead of 1.35c., and open hearth bars 1.35c. instead of 1.40c.

Orders for structural shapes and plates are booked more freely. As already noted, a satisfactory schedule for fabricating was arranged before the Lackawanna Steel Co. agreed to become a member of the beam pool. It is reported that $13 a short ton was agreed upon for fabricating and $12 for erecting, making a total of 1.25c. per lb.; this, with 1.40c. for material, would make a bridge or building cost at the rate of 2.65c. It is generally believed that the contract for the Chicago elevated work was taken at about 2.50c. per lb. While the new schedule will benefit independent manufacturers and shops, the division in the price will not particularly benefit buyers. The plate mills are all busy, as the steel car works are specifying more liberally than heretofore, indicating an increase in orders for cars. The American Sheet & Tin Plate Co., it is reported, has under consideration a rebate system which will benefit its largest tin plate customers by giving them an inside price. The big company is operating most of its mills while few of the independent plants are running. There have been frequent reports lately of railroads inquiring for rails, but all lack official confirmation. The rail business will fall short of the past two years and it is not necessary to get into the market so early. The export business of the Steel Corporation is unusually heavy, and reports for August show that in wire alone the increase has been 50% over the previous month.

There has been a notable improvement in the iron market and the prospects for a good fall buying movement are considered bright. Inquiries for pig iron are more numerous than in several months, and a number of orders for future delivery are expected to be placed within the next few days. One manufacturer estimates that fully 50,000 tons of all grades of pig iron will be contracted for at the present rates, the lowest price named for bessemer being $12, valley furnaces. The Westinghouse Electric & Manufacturing Co. has just closed contracts for 8,000 tons of foundry No. 2, 5,000 tons for its Allegheny and 3,000 for its Cleveland works. Of this 7,000 is northern and 1,000 tons is southern iron. The price paid is not made public. Yesterday the National Tube Co. contracted for 2,500 tons of southern gray forge. A number of smaller orders for pig iron were placed during the week, and prices are reported unusually firm. There are but two or three idle blast furnaces in the Pittsburg district, and most of the furnaces in the Mahoning and Shenango valleys are in operation. It is reported that out of 51 furnaces operated by the United States Steel Corporation 40 are in blast.

Pig Iron.—The market this week shows an improvement. Sales for the week aggregate nearly 13,000 tons. It is said that negotiations for fully 50,000 tons may be concluded within the next two weeks, although in some circles this is considered an extravagant figure. Prices are firm and quotations are as follows: Bessemer, $12, valley; foundry No. 2, $12.85@$13, Pittsburg, and gray forge, $11.85@$12, Pittsburg.

Steel.—The uncertainty regarding billet prices is over, the $23 price for bessemer and open hearth billets having been cut to $19.50 f.o.b. Pittsburg, with freight added to destination. Sheet bars are $21.50 Pittsburg, having been reduced from $24. Bessemer steel bars have been cut from 1.35c. to 1.30c., and open hearth bars from 1.40c. to 1.35c. Plates are firm at 1.40c.

Sheets—The sheet market remains about the same, but the cut in sheet bars may affect prices later. No. 28 gauge black sheets are still quoted at 2.10c. and galvanized at 3.10@3.15c.

Ferro-manganese.—The market is quiet, and domestic 80% continues to be quoted at $41.50.

CHEMICALS AND MINERALS.

New York, Sept. 21.

Business continues to improve slowly and prices show a steady undertone.

Cyanide.—Quiet at 18@19c. per pound.

Bleaching Powder.—It is understood that some contracts for next year's delivery have been renewed at an advance in price. Spot business is still being done on the basis of $1.20@$1.25 per 100 lb. for prime brands.

Copper Sulphate.—Prices have advanced to $4.75@$5 per 100 lb., as a result of the strength in the metal market. Exports from Great Britain in the eight months ending August 31 were 65,353 long tons, showing an increase of 16,072 tons as compared with last year.

Acids.—The preparations of the Naugatuck Chemical Co., capital $100,000, to erect a large acid plant at Naugatuck, Conn., are attracting some attention. The sales agency will be the Charles E. Sholes Co., of New York, capital $50,000. Both firms are controlled by the same people. Trade in acids is looking well, and some makers have already booked substantial orders for sulphuric for 1905 delivery.

We quote as below per 100 lb., unless otherwise specified, for large lots in carboys or bulk ore (tank cars), delivered in New York and vicinity:

Muriatic, 18°	$1.50	Oxalic, com'l	$5.00@$5.25
Muriatic, 20°	1.60	Sulphuric, 50°	
Muriatic, 22°	1.75	bulk, ton	13.50@14.50
Nitric, 36°	4.50	Sulphuric, 60°	1.05
Nitric, 38°	4.75	bulk, ton	18.00@20.00
Nitric, 40°	5.00	Sulphuric, 66°	1.20
Nitric, 42°	5.50	bulk, ton	21.00@23.00

Brimstone.—Sales in quantity of Sicilian best unmixed seconds for shipment are reported at $21.25@$21.50, and of domestic at $21.20@$21.45 for 98%, according to receiving port, and $21.75 for 99.5%.

Pyrite.—Few orders have been booked this week at unchanged prices. Imports into Great Britain in the eight months ending August 31 were 523,153 tons, containing approximately 245,882 tons sulphur. This is an increase of 2,014 tons pyrite (947 tons sulphur) as compared with 1903.

Nitrate of Soda.—Although quiet, the market continues very strong, and importers are of the belief that high prices will rule for some time. Spot 95% is quoted $2.175 per 100 lb., and futures, $2.20@$2.225. Refined quality is worth about 2½c. per 100 lb. more than 95%.

Chilean Nitrate of Soda Market.—Messrs. Jackson Bros., of Valparaiso, write us, under date of August 6, that the market has been very dull throughout the fortnight, and in absence of any general demand, some sellers and resellers have shown a disposition to accept lower prices. As high as 7s. 9d. alongside was paid for a small parcel of 95%, September delivery, but since then 7s. 7d. has been accepted for October, with early payment. The statistical position for the seven months ending July 31 is shown below, in quintals:

	1903.	1904.	Changes.
Production	18,134,000	17,760,000	D. 374,000
Exports	14,329,000	15,131,000	I. 802,000
Consumption	24,193,000	24,206,000	I. 13,000

We quote 95%, August-November delivery, at 7s. 8½d.; December, 7s. 7d.; January-February, 1905, 7s. 6½d.; and 96%, 7s. 9d., all alongside, sellers. The price of 7s. 8½d., with an all round freight of 16s. 3d., stands in 9s. 4½d. per cwt. net cost and freight, without purchasing commission.

Sulphate of Ammonia.—Orders are few. Speculatively speaking, the market is firmer. Good gas liquor is worth $3.00@$3.05 per 100 lb., according to position.

Phosphates.—Exports are pretty regular, although the movement of high-grade Florida rock through Savannah in August amounted to only 3,722 tons, all to Italy. Since January this port has handled 78,060 tons, which is 7,387 tons less than was reported in the corresponding eight months last year.

Phosphates are quoted as follows, per ton:

Phosphates.	F. o. b.	C. i. f. Gt. Britain or Europe.
*Fla., hard rock, 77@80%	$7.25@$7.50	$10.86@11.85
land pebble, 68@73%	3.75@ 4.00	7.70@ 8.40
†Tenn., 78@80%	4.00@ 4.25	10.27@10.67
78%	3.75@ 4.00	.....
75%	3.25@ 3.50	.....
‡So. Car. land rock	3.25@ 3.50	.....
river rock, 55@60%	3.00@ 3.25	6.33@ 6.56
Algerian, 63@70%	.....	6.93@ 7.59
58@63%	.....	6.15@ 6.60
53@58%	.....	5.05@ 5.20
Tunis (Gafsa)	.....	6.33@ 6.50
Christmas Isle, 80@85%	.....	13.20@14.03
Ocean Isle, 82@88%	.....	13.60@14.45
Somme, Fr., 70@75%	.....	10.63@11.02
Bordeaux, Fr., 60@65%	.....	7.60@ 7.72
55@60%	.....	6.44@ 6.55
Liege, Bel., 60@65%	.....	7.00@ 7.10

*F. o. b. Florida or Georgia ports. †F. o. b. Mt. Pleasant. ‡On vessel, Ashley River, S. C.

METAL MARKET.

New York, Sept. 21.

Gold and Silver Exports and Imports

At all United States Ports in August and Year.

Metal.	August.		Year.	
	1903.	1904.	1903.	1904.
Gold:				
Exports	$84,776	$10,762,818	$40,538,775	$80,295,460
Imports	7,848,553	7,761,371	26,455,814	64,450,515
Excess	E. $7,763,777	E. $3,001,447	E. 14,082,961	E. $15,844,945
Silver:				
Exports	2,019,655	4,848,932	22,540,420	35,751,145
Imports	2,368,519	2,513,550	14,914,030	17,670,167
Excess	I. $348,864	E. $2,335,382	E. $7,626,390	E. $18,080,978

Gold and Silver Exports and Imports, New York.

For the week ending September 17 and for years from January 1st.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports
Week	$524,000	$31,603	$599,350	$15,943
1904	72,934,064	3,853,899	28,240,522	665,431
1903	31,416,903	6,324,730	21,668,787	2,938,638
1902	24,520,118	1,813,392	18,731,343	924,248

Gold exports continue to be made chiefly to Montevideo, and silver to London. Imports were principally from Central America and the West Indies.

Exports of merchandise from the United States in August were better than July. For the eight months ending August 31 the statement of the Bureau of Statistics of the Department of Commerce and Labor is as follows:

	1903.	1904.
Exports	$878,911,631	$851,637,657
Imports	676,981,594	667,017,851
Excess exports	$201,930,037	$184,619,806
Add excess of exports, silver		18,080,978
gold		15,844,945
Total export balance		$218,546,729

The gold and silver movement in detail will be found in the table at the head of this column.

The statement of the New York banks—including the 56 banks represented in the Clearing Houses—for the week ending September 17, gives the following totals, comparisons being made with the corresponding week of 1903:

	1903.	1904.
Loans and discounts	$922,055,800	$1,140,958,800
Deposits	909,482,300	1,224,206,600
Circulation	45,366,900	40,107,300
Specie	169,391,900	257,022,200
Legal tenders	71,152,300	78,382,600
Total reserve	$240,544,200	$335,404,800
Legal requirements	227,370,575	306,051,650
Balance surplus	$13,173,625	$29,353,150

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars, and comparison is made with the holdings at the corresponding date last year:

	1903.		1904.	
	Gold.	Silver.	Gold.	Silver.
N. Y. Ass'n.	$169,391,900	.....	$257,022,200	.....
England	171,570,365	.....	190,768,655	.....
France	503,329,330	$223,490,925	530,722,745	$222,525,350
Germany	176,680,000	62,080,000	176,605,000	62,050,000
Spain	73,225,000	100,240,000	73,850,000	101,765,000
Netherlands	19,755,500	32,026,500	27,401,000	31,415,000
Belgium	14,430,000	7,215,000	16,170,000	8,085,000
Italy	96,720,000	11,468,000	110,365,000	20,444,500
Russia	416,875,000	41,375,000	474,315,000	42,900,000
Austria	227,375,000	63,810,000	242,460,000	61,785,000

The returns of the Associated Banks of New York are of date September 17, and the others September 15, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

The silver market has improved this week, owing to short supplies in London, and closes steady, but demand from east is uncertain.

The United States Assay Office in New York reports receipts of 86,000 oz. of silver for the week.

Indian exchange is steady, and the Council bills offered in London have been taken at 16d. per rupee. More gold is expected from Australia. There is still a plentiful supply of money in India.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars	$0.45½	$0.47
Peruvian soles and Chinese pesos	.41½	.43
Victoria sovereigns	4.85	4.87
Twenty francs	3.87	3.90
Spanish 25 pesetas	4.79	4.82

OTHER METALS.

Daily Prices of Metals in New York.

September.	Copper. Lake, Cts. per lb.	Electrolytic, Cts. per lb.	Cathodes, Cts. per lb.	London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. Per lb.	Spelter. St. Louis, Cts. per lb.
15	12¼ @12⅜	12¼ @12⅜	12¼ @12⅜	57 5/16	27¼	4.20	5.05 @5.07½	4.90 @4.92½
16	" 12⅜	" 12⅜	" 12⅜	57⅛	28	4.20	5.05 " 5.07½	4.90 "4.92½
17	" 12⅜	" 12⅜	" 12⅜	....	28	4.20	5.05 " 5.07½	4.90 "4.92½
19	" 12⅜	" 12⅜	" 12⅜	58¼	28¼	4.20	5.05 " 5.07½	4.90 "4.92½
20	" 12⅜	" 12⅜	" 12⅜	58¼	28¼	4.20	5.05 " 5.07½	4.90 "4.92½
21	" 12⅜	" 12⅜	" 12⅜	58¼	27¾ @27½	4.20	5.05 " 5.07½	4.90 "4.92½

London quotations are per long ton (2,240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wire-bars.

SILVER AND STERLING EXCHANGE.

September	Sterling Exchange.	Silver. New York. Cents.	Silver. London. Pence.	September	Sterling Exchange.	Silver. New York. Cents.	Silver. London. Pence.
15	4.8675	56¼	26 3/16	19	4.8650	57¼	26⅛
16	4.8675	56¼	26⅛	20	4.8625	57⅛	26 1/16
17	4.8650	56⅛	26⅛	21	4.86	57¼	26 1/16

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver .925 fine.

Copper has again been very active throughout the week, and the market continues to display considerable strength. The European demand remains very satisfactory, while home consumers also show more interest in the article, and large orders have been placed for early as well as future delivery. Under the circumstances prices show a further advance, and the closing quotations are given as 12⅝@12¾c. for Lake; 12½@12⅝c. for electrolytic in ingots, cakes and wirebars; 12¼@12⅜c. in cathodes; 12¼@12⅜c. for casting copper.

The market for standard copper in London, which closed last week at £57 15s., advanced on Monday to £58 5s., and the closing quotations on Wednesday are cabled as £58@£58 2s. 6d. for spot, £58 1s. 3d.@£58 2s. 6d. for three months.

Statistics for the first half of September show a decrease in the visible supplies of 500 tons.

Refined and manufactured sorts we quote: English tough, £60 10s.@£60 15s.; best selected, £61 10s.@£61 15s.; strong sheets, £70@£70 10s.; India sheets, £68@£68 10s.; yellow metal, 6⅛@6¼d.

Exports of copper from New York and Baltimore for the week ending September 20 were 4,353 long tons. Imports at New York for the week of September 16 were 157 tons.

Imports of copper and copper material into Great Britain, with exports of copper, for the eight months ending August 31, are reported as follows, in long tons, the totals showing the contents in fine copper:

	1903.	1904.	Changes.
Copper ores	58,366	49,630	D. 8,736
Matte, etc.	49,208	41,705	D. 7,503
Fine copper	41,123	60,212	I. 19,089
Total fine copper	71,564	86,027	I. 14,463
Exports	39,487	37,935	D. 1,552
Net imports	32,077	48,092	I. 16,015

Of the imports this year, 66 tons ore, 3,644 tons matte and 32,068 tons fine copper were from the United States, which compare with 336 tons ore, 3,339 tons matte and 13,894 tons fine copper last year.

Tin.—The upward movement, which has been in progress for some time past, culminated on Monday in a quotation of 28¼c. Since then a reaction has set in, and the market closes rather flat at 27¾@27⅞c. for spot and futures. Consumers over here remain rather apathetic and are only covering their immediate requirements.

The foreign market, which closed last week at £127 12s. 6d., opened on Monday at £128 12s. 6d., declined on Tuesday to £127 15s., and

the closing quotations on Wednesday are cabled as £126 15s.@£126 17s. 6d. for spot, £127 5s.@£127 7s. 6d. for three months.

Imports and exports of tin in Great Britain for the eight months ending August 31 were as follows, in long tons:

	1903.	1904.	Changes.
Straits	17,171	19,679	I. 2,508
Australia	2,959	2,767	D. 192
Other countries	2,035	1,816	D. 219
Total imports	22,165	24,262	I. 2,097
Exports	18,135	21,877	I. 3,742
Net imports	4,030	2,385	D. 1,645

Exports include those of foreign metal, as well as domestic.

Lead remains quiet but steady, without any special feature. The closing quotations are given as 4.20c. New York, 4.12½c. St. Louis.

The foreign market is strong and advancing, the quotation for Spanish lead being cabled as £11 16s. 3d.@£11 17s. 6d., English lead £11 18s. 9d.@£12.

Imports and exports of lead in Great Britain for the eight months ending August 31 were as follows, in long tons:

	1903.	1904.	Changes.
United States	25,727	25,036	D. 692
Spain	70,004	74,446	I. 4,441
Australia	41,139	49,225	I. 8,086
Other countries	15,346	18,579	I. 3,133
Total imports	152,216	167,286	I. 15,070
Exports	22,134	24,198	I. 2,064
Net imports	130,082	143 088	I. 13,006

The lead credited to the United States is chiefly Mexican metal, refined here in bond.

St. Louis Lead Market.—The John Wahl Commission Company telegraphs us as follows: Lead is unchanged, 4.12½c. being quoted for both Missouri and argentiferous brands.

Spelter.—The market continues to display considerable strength, and there is a good consumptive demand. Producers are rather reluctant sellers, owing to the high prices asked for zinc ore. The closing quotations are 4.90@4.92½c., St. Louis; 5.05@5.07½c., New York.

The foreign market is firm, good ordinaries being quoted at £22 10s., specials at £22 12s. 6d.

Imports and exports of spelter in Great Britain for the eight months ending August 31 were as follows, in long tons:

	1903.	1904.	Changes.
Spelter	55,096	57,280	I. 2,184
Zinc sheets, etc	14,911	15,066	I. 155
Total	70,007	72,346	I. 2,339
Exports	5,108	4,958	D. 150
Net imports	64,899	67,388	I. 2,489

The imports were chiefly from Germany and Belgium.

St. Louis Spelter Market.—The John Wahl Commission Company telegraphs us as follows: Spelter is quiet but firm. Latest sales are on a basis of 4.95c. East St. Louis, at which price a moderate amount of trading has been done during the past week.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt write from Cartagena, Spain, under date of September 3, that the demand for zinc ore continues very brisk, and the sharp competition for the medium and better grades of blende has caused prices to advance at the mines out of all proportion to the value of spelter. Prices are 67 fr. per ton for blende, 35% zinc, and 47 fr. for calamine, 30% zinc. Exports for the week were 3,850 tons to Belgium and 2,100 tons to Germany.

Antimony is dull and neglected. We quote Cookson's at 6¾@7c.; Hallett's, 6⅜@6⅝c.; United States, French, Hungarian, Italian, Japanese and Chinese, 5⅞@6c. per pound.

Nickel.—The price is quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quantity, runs as high as 60c. per pound.

Platinum.—Quotations are nominally $18.50 per ounce, but the tendency is upward and higher prices are expected. The drafting of laborers from the mines in the Urals, owing to the Eastern war, has further strengthened prices for platinum.

Platinum in manufactured forms is very firm. Messrs. Eimer & Amend, of New York, quote for different forms as follows: Heavy sheet and rod, 75c. per gram; foil and wire, 77c.; crucibles and dishes, 80c.; perforated ware, like cones, etc., 85c. per gram.

Quicksilver.—Prices are lower. In New York large lots have been offered at $40.00 per flask (75 lb.), with $41@$42 quoted for smaller orders. The San Francisco price is now $41.50 @$42. London price is £7 15s., with the same quotation from second-hands.

Imports and re-exports of quicksilver in Great Britain in the eight months ending August 31 were as follows, in pounds:

	1903.	1904.	Changes.
Imports	2,533,551	2,414,866	D. 118,685
Re-exports	1,040,915	1,109,576	I. 68,661
Net imports	1,492,636	1,305,290	D. 187,346

Imports were from Spain and Italy; exports principally to South Africa.

Minor Metals and Alloys.—Thallium is quoted at 60@65 marks per kg. at Breslau, Germany. Manganese metal is quoted 360 marks per 100 kg., f. o. b. Bremen, Germany. Manganese tin alloy, 55%, is quoted 365 marks per 100 kg. for first quality and 225 marks for second quality, both f. o. b. Bremen.

For other minor metals and their alloys, wholesale prices, f. o. b. works, are as follows:

Aluminum.	Per lb.		Per lb.
No. 1. 99% ingots	33@37c	Ferro-chrom. (74%)	12½c.
No. 2. 99% ingots	31@34c	Ferro-Tungsten (37%)	45c.
Rolled Sheets	4c. up	Magnesium, pure (N. Y.	1.60
Alum-bronze	20@23c.		
Nickel-alum	33@39c.	Manganese, 98@99%	
Bismuth	$2.10	(N. Y.)	75c.
Chr'm'm, pure (N.Y.)	80c.	Manganese, Cu., 30@70%	
Copper, red oxide	50c.	(N. Y.)	40c.
Fe.-Molybd'm (50%)	$1.00	Molybdenum, 98@99%	
Ferro-Titanium (10%)	90c.	(N. Y.)	$2.75
Ferro-Titanium (20@25%)		Phosphorus, foreign	45c.
N. Y.	75c.	Phosphorus, American	70c.
Ferro-Vanadium, 25% (N. Y.)	$3.00	Sodium metal	50c.
		Tungsten (Best)	$1.25

Differences in price depend chiefly upon size and conditions of order.

Missouri Ore Market. Sept. 17.

(From Our Special Correspondent.)

The highest price paid was $43.50 per ton for the Bumblebee ore in Joplin. This is an advance of but $2.50 over the highest price a week ago, but an advance of $4 per ton for the Bumblebee. At least one lot of ore sold at $43, and this is said to be equivalent to $42 basis, but the purchasing agents assert that they are not buying any ore on a basis price higher than $40 per ton of 60% zinc. When they want the ore and do not want to raise the assay price they buy it on straight bids. In that way the Bumblebee, a 64 to 65% zinc, sold at $43.50, and the Belmont, a 61% zinc, sold at $43 per ton. Based on the claims of the agents, the assay basis is $38 to $40 per ton of 60% zinc. Lead is unchanged, selling all the week at $53.50 per ton for choice lots. The Carterville lead smelter has given up the business, at least for the present.

A year ago the highest price for zinc ore was $40, and the assay basis only $34 to $36 per ton of 60% zinc, on a spelter market nearly $1 higher. Lead was then $56 per ton.

Following are the shipments of zinc and lead from the various camps of the Joplin district for the week ending September 10:

	Zinc lb.	Lead lb.	Value.
Joplin	2,801,670	254,800	$62,080
Webb City-Carterv'l	2,213,540	254,800	52,040
Duenweg	1,053,390	241,400	27,470
Galena-Empire	863,050	112,330	19,460
Alba-Neck	733,230	.....	14,668
Granby	738,000	55,000	12,540
Aurora	710,990	17,480	10,950
Prosperity	176,540	70,740	5,390
Carthage	257,740	.....	5,150
Zincite	196,070	4,460	4,040
Badger	170,960	5,980	3,580
Oronogo	127,600	21,130	2,760
Spurgeon	114,550	3,040	2,530
Sherwood	71,510	21,670	1,940
Diamond	64,460	.....	1,220
Beef Branch	53,700	14,870	840
Peoria	.....	33,860	880
Totals	10,346,330	1,233,940	$227,030
37 weeks	376,268,200	47,431,930	$7,582,630

Zinc value, the week, $194,160; 37 weeks, $6,291,970
Lead value, the week, 32,870; 37 weeks, 1,290,660

In the week ending September 10 the highest price paid for zinc ore was $41, or $1 over the previous week. The assay basis price was strong on a $39 basis for medium grade ores and $37@$38 per ton of 60% zinc for choice grades. Zinc ore sold at $53.50 per ton.

Average Prices of Metals per lb., New York.

Mo.	Tin.		Lead.		Spelter.	
	1903.	1904.	1903.	1904.	1903.	1904.
Jan	28.33	28.845	4.075	4.347	4.865	4.863
Feb	29.43	28.087	4.075	4.375	5.043	4.916
Mar.	30.15	28.317	4.442	4.475	5.349	5.057
April	29.81	28.132	4.567	4.475	5.550	5.219
May	29.51	27.718	4.325	4.423	5.639	5.031
June	28.34	26.325	4.210	4.196	5.697	4.760
July	27.68	26.573	4.075	4.192	5.662	4.873
Aug.	28.29	27.012	4.075	4.111	5.725	4.866
Sept	26.77	.....	4.243	.....	5.686	.....
Oct	25.92	.....	4.375	.....	5.510	.....
Nov.	25.42	.....	4.218	.....	5.038	.....
Dec	27.41	.....	4.162	.....	4.731	.....
Year	28.09	.....	4.237	.....	5.400	.....

NOTE.—The average price of spelter in St. Louis for the month of January, 1904, was 4.673c. per lb.; February, 4.717c.; March, 4.841c.; April, 5.038c.; May, 4.853c.; June, 4.596c.; July, 4.723c.; August, 4.716c.

Average Prices of Copper.

Mo.	New York.				London.	
	Electrolytic.		Lake.		Standard.	
	1903.	1904.	1903.	1904.	1903.	1904.
Jan	12.159	12.410	12.361	12.553	53.52	57.55
Feb	12.778	12.063	12.901	12.245	57.34	56.57
Mar.	14.416	12.299	14.572	12.551	63.85	57.321
April	14.454	12.923	14.642	13.120	61.72	58.247
May	14.435	12.758	14.618	13.000	61.73	57.321
June	13.942	12.269	14.212	12.399	57.30	56.398
July	13.094	12.380	13.341	12.505	56.64	57.256
Aug.	12.962	12.343	13.159	12.468	58.44	56.952
Sept	13.205	.....	13.345	.....	56 82	.....
Oct	12.801	.....	12.954	.....	55.60	.....
Nov.	12,617	.....	12.813	.....	56.30	.....
Dec	11,952	.....	12,084	.....	56.36	.....
Year	13.235	.....	13.417	.....	57.97	.....

New York prices are in cents, per pound; London prices in pound sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars; prices of cathodes are usually 0.25 cent. lower.

Average Prices of Silver, per ounce Troy.

Mo.	1902.		1903.		1904.	
	London, Pence.	N. Y., Cents.	London, Pence.	N. Y., Cents.	London, Pence.	N. Y., Cents.
Jan	25.62	55.56	21.98	47.57	26.423	57.055
Feb	25.41	55.09	22.11	47.89	26.665	57.592
Mar.	25.00	54.23	22.49	48.72	26.164	56.741
April	24.34	52.72	23.38	50.56	24.974	54.202
May	23.71	51.31	24.89	54.11	25.578	55.430
June	24.17	52.36	24.29	52.86	25.644	55.673
July	24.38	52.88	24.86	53.92	26.760	58.095
Aug.	24.23	52.52	25.63	55.36	26.591	57.806
Sept	23.88	51.52	26.75	58.00	.....	.....
Oct	23.40	50.57	27.89	60.36	.....	.....
Nov.	22.70	49.07	27.01	58.11	.....	.....
Dec	22.21	48.03	25.73	55.375	.....	.....
Year	24.09	52.16	24.75	53.57	.....	.....

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

DIVIDENDS.

Company.	Latest Dividend. Payable.	Rate.	Total.	Total to date.
†Am.Sm.&Ref.com.	Oct. 25	$1.25	$625.000	$2,500,000
†Am.Sm.&Ref., pf.	Oct. 11	1.75	875,000	15,891,553
Calumet & Hecla	Sept. 27	10.00	1,000.000	86,350.000
Carmen, Pachuca	Sep. 16	2.29	2,519	81,135
†CentralC.&C.,com.	Oct. 15	1.50	76,875	858,750
†Central C. & C.,pf.	Oct. 15	1.25	23.437	890,620
†Gen'l Chem., pf	Oct. 1	1.50	150,000	3,175,178
†Guggenheim Expl.	Oct. 11	1.75	183,750	1,286,250
†Homestake, S. D.	Sept. 25	.25	54.600	12,859,150
N. Y. & Hond. Ros.	Sept. 24	.10	15,000	1,875,000
†Soledad, Mex.	Sept. 20	9.15	8,784	318,616
†Sloss-Sheffield,pf.	Oct. 1	1.75	117.250	2,205,000
†Sorpresa, Mex.	Sept. 20	2.29	2,194	321,554
†Tex. & Pac. Coal.	Oct. 1	1.50	30,000	1,890,000
†Va. Car Chem., pf.	Oct. 15	2.00	360,000	8,220,868
Wolverine, Mich.	Oct. 1	4.00	240,000	1,770,000

†Quarterly.

ASSESSMENTS.

Company.	Delinquent.	Sale.	Amount.
Alpha Con., Nev	Oct. 3	Oct. 24	$0.05
Belcher, Nev.	Sept. 13	Oct. 4	.10
California, Cal.	Oct. 1	.....	.05
Confidence, Nev	Sept. 19	Oct. 7	.20
Con. New York, Nev	Sept. 13	Oct. 4	.05
Marina Marsicano, Cal.	Sept. 29	Oct. 31	.05
Mexican, Nev.	Sept. 12	Oct. 3	.15
Mohican, Cal.	Oct. 15	.....	.10
New Montezuma, Cal.	Oct. 12	.....	.02
Orleans Con., Cal.	Sept. 15	Oct. 31	.07
Savage, Nev.	Oct. 5	Oct. 26	.10
South Columbus, Utah	Sept. 23	Oct. 12	.01
Utah Con., Nev.	Sept. 10	Oct. 2	.05
Yellow Jacket, Nev	Sept. 22	Oct. 27	.10

STOCK QUOTATIONS

NEW YORK.

Company.	Par val.	Sept. 14 H.	Sept. 14 L.	Sept. 15 H.	Sept. 15 L.	Sept. 16 H.	Sept. 16 L.	Sept. 17 H.	Sept. 17 L.	Sept. 19 H.	Sept. 19 L.	Sept. 20 H.	Sept. 20 L.	Sales.
Amalgamated	100	58½	57¾	58¾	57¾	59½	58	59	57¾	59½	58	59¾	57½	219,047
Anaconda C.	25	85	84¾	86½	....	90	88	89	88½	94¼	92	.98	.94	18,610
Anaconda, G	5	....	....	....	....	....	....	....	....	....	....	....	....	....
Belcher	1	....	....	....	....	....	....	....	....	....	....	.28	....	500
Best & Belcher	3	....	....	....	....	....	....	....	....	....	....	1.15	....	100
Brunswick	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Caledonia	1	....	....	.64	....	.62	....	....	....	....	....	....	....	200
Chollar	2½	....	....	....	....	....	....	....	....	....	....	....	....	....
Confidence	3	....	....	....	....	.65	....	....	....	....	....	....	....	100
Con. Cal. & Va.	3	....	....	1.15	....	....	....	1.00	....	....	....	1.10	....	285
Con. Imperial	2½	....	....	....	....	....	....	....	....	....	....	....	....	....
Cripple Creek Con.	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Crown Point	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Elkton	1	....	....	.64	....	....	....	.64	.63	....	....	....	....	400
El Paso	1	.95	....	.95	.94	....	....	....	....	....	....	....	....	1,500
Gold Dollar	1	.07	....	....	....	.10	....	.07	....	....	....	.07	.06	3,500
Gold Sovereign	1	....	....	....	....	.06	....	....	....	....	....	....	....	1,000
Gould & Curry	1	....	....	....	....	.17	....	....	....	....	....	....	....	200
Greene Con.	10	15¾	15½	15½	15½	15½	15¾	15½	15¾	15½	15¾	15½	15¾	14,100
Hale & Norcross	3	.60	....	.56	....	....	....	....	....	.61	.57	....	....	500
Homestake	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Horn Silver	20	1.65	....	....	....	....	....	....	....	....	....	....	....	200
Iron Silver	20	....	....	....	....	....	....	....	....	....	....	....	....	....
Isabella	1	.20	....	....	....	....	....	.14	....	....	....	....	....	1,500
Julia s.	1	....	....	....	....	.10	....	....	....	....	....	....	....	100
Justice	2	....	....	.10	....	....	....	.11	....	....	....	....	....	500
Keystone	1	.05	....	....	....	....	....	....	....	....	....	....	....	500
Little Chief	50	....	....	....	....	....	....	....	....	....	....	.07	.06	500
Mexican	3	....	....	.94	....	....	....	....	....	....	....	....	....	100
Mollie Gibson	5	....	....	....	....	....	....	....	....	....	....	....	....	....
Moon Anchor	3	....	....	....	....	....	....	....	....	....	....	.08	....	500
Moulton	25	....	....	....	....	....	....	....	....	....	....	.16	....	50
Occidental	3	....	....	.82	....	....	....	....	....	....	....	....	....	100
Old Gold g	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Ophir	5	2.25	....	2.25	....	....	....	....	....	....	....	2.30	....	300
Pharmacist	1	....	....	....	....	....	....	.03	....	.04	....	....	....	4,000
Phoenix	1	.15	....	.15	....	.17	....	.17	....	....	....	....	....	4,000
Portland	1	1.65	....	....	....	....	....	....	....	....	....	1.70	....	300
Potosi	1	....	....	.11	....	....	....	....	....	.13	.09	.10	....	1,200
Savage	3	....	....	....	....	.16	....	....	....	....	....	....	....	400
Sierra Nevada	3	....	....	....	....	....	....	.31	.30	....	....	....	....	400
Standard Con.	10	....	....	2.00	....	....	....	....	....	....	....	....	....	100
Tennessee	25	31¾	....	31¾	31¾	32	....	....	....	32¼	32¼	.33	32½	1,350
Union Con	1	....	....	....	....	....	....	....	....	....	....	....	....	....
Union Copper	10	1	....	1 1/16	1	1 1/16	1	1¼	1	....	....	1⅛	....	3,280
United Cp. Com.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
United Cp. Pf.	100	....	....	....	....	....	....	....	....	....	....	....	....	....
White Knob	10	3¾	....	3¾	3¾	3¾	....	4	....	4¼	3¾	4¼	4	2,655
Work	1	....	....	....	....	.09	....	....	....	....	....	....	....	1,000
Yellow Jacket	1	1 27	....	....	....	....	....	....	....	....	....	....	....	300

Total sales, 283,377 shares.

COAL, IRON AND INDUSTRIAL STOCKS.

Company.	Par val.	Sept. 14 H.	Sept. 14 L.	Sept. 15 H.	Sept. 15 L.	Sept. 16 H.	Sept. 16 L.	Sept. 17 H.	Sept. 17 L.	Sept. 19 H.	Sept. 19 L.	Sept. 20 H.	Sept. 20 L.	Sales.
Allis-Chalmers	$100	....	....	....	....	....	....	....	....	....	....	....	....	....
Preferred	100	50	....	....	....	....	....	....	....	....	....	....	....	....
Am. Agr. Chem	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Preferred	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Am. Sm. & Ref.	100	67½	66½	66¾	65½	66¾	65¾	66	65¾	....	....	....	....	....
Preferred	100	109½	108½	108½	107½	108	....	107½	107½	....	....	....	....	....
Col. Fuel & I.	100	40½	38¾	39½	33¾	36	31¾	36½	35½	....	....	....	....	....
Preferred	100	65	....	....	....	....	....	....	....	....	....	....	....	....
Col. & H. C. & I.	100	13¾	13	13½	13½	13¾	12½	13¾	13	....	....	....	....	....
Crucible Steel.	100	6¾	6½	6½	6½	6¾	6½	6¾	....	....	....	....	....	....
Preferred	100	40½	40	41	40½	41	40½	40¾	40¾	....	....	....	....	....
General Chemical	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Preferred	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Mong. R. Coal	50	....	....	....	....	....	....	....	....	....	....	....	....	....
Preferred	50	21¾	....	....	....	....	....	21¾	....	....	....	....	....	....
National Lead	100	24¼	24	24¼	24¼	24½	23¾	24½	....	....	....	....	....	....
Preferred	100	....	....	96	....	....	....	....	....	....	....	....	....	....
Phila. Nat. Gas.	100	42½	41½	42½	....	....	....	....	....	....	....	....	....	....
Preferred	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Pittsburg Coal	100	....	....	....	....	14	13½	13¾	....	....	....	....	....	....
Preferred	100	61	60	61¾	60¾	61¾	61	61¾	61	....	....	....	....	....
Republic I. & S.	100	8¾	8¾	9¼	8¾	9¼	8¾	8¾	8¾	....	....	....	....	....
Preferred	100	43¾	43¼	44	43¾	44	43¾	44¼	44	....	....	....	....	....
Sloss-Shef. S & I.	100	....	....	41	40	40¾	....	....	....	....	....	....	....	....
Preferred	100	....	....	89¾	89¼	....	....	....	....	....	....	....	....	....
Standard Oil	100	640	636	640	637	641	640	....	....	....	....	....	....	....
Tenn. C. I. & R.R.	100	49	47¾	49¼	47¾	48¾	47¾	49	48	....	....	....	....	....
U. S. Steel Corp.	100	16¼	15⅝	18¼	16¼	18¼	16¾	18¼	17¾	....	....	....	....	....
Preferred	100	67¼	65	68¾	67	69¼	66¾	69¾	6⁷⁄₈	....	....	....	....	....
Va.-Car Chem.	100	36¾	34½	37¾	36¾	36¾	36¼	109½	108½	....	....	....	....	....
Preferred	100	109½	10⁷⁄₈	108¾	108	109	108¾	....	....	....	....	....	....	....

*Pittsburg Exchange; all others, New York Stock Exchange.

SAN FRANCISCO.*

Company.	Location.	Sept. 8 H.	Sept. 8 L.	Sept. 9† H.	Sept. 9† L.	Sept. 10† H.	Sept. 10† L.	Sept. 12 H.	Sept. 12 L.	Sept. 13 H.	Sept. 13 L.	Sept. 14 H.	Sept. 14 L.	Sales.
Golden Anchor	Nev.	....	....	....	....	....	....	....	....	....	....	....	....	....
MacNamara	Nev.	.41	.30	....	....	....	....	.45	.36	....	....	.37	.31	72,700
Mont. Tonopah	Nev.	2.15	2.00	....	....	....	....	2.05	1.95	192½	1.90	1.65	1.45	10,700
Ton. Belmont	Nev.	.61	.60	....	....	....	....	.61	.60	....	....	.57	....	2,100
Ton. Midway	Nev.	.40	.38	....	....	....	....	.43	.39	.39	....	.38	.37	5,300
Ton. Mg. Co	Nev.	7.62½	....	....	....	....	....	8.00	....	....	....	7.75	....	225
Ton. North Star	Nev.	....	....	....	....	....	....	....	....	....	....	.20	.18	3,300

*San Francisco & Tonopah Exchange, Total sales, 94,325 shares. †Holiday

SAN FRANCISCO (By Telegraph.)

Company	September 19	September 20	Company	September 19	September 20
Belcher	$0.30	$0.30	Gould & Curry	$0.20	$0.19
Best & Belcher	1.10	1.10	Hale & Norcross	.58	.58
Caledonia	.61	.61	Mexican	1.00	1.00
Challenge Con.	.18	.18	Ophir	2.25	2.25
Chollar	.13	.13	Overman	.20	.20
Confidence	.85	.80	Sierra Nevada	.30	.30
Con. California & Virginia	1.10	1.10	Union Con	.39	.40
Crown Point	.16	.14	Yellow Jacket	.25	.25

BOSTON, MASS.

Company.	Par val.	Sept. 14 H.	Sept. 14 L.	Sept. 15 H.	Sept. 15 L.	Sept. 16 H.	Sept. 16 L.	Sept. 17 H.	Sept. 17 L.	Sept. 19 H.	Sept. 19 L.	Sept. 20 H.	Sept. 20 L.	Sales.
†Adventure Con.	$25	2	1¾	....	....	†2½	....	....	....	2½	2¼	....	....	....
Alloues	25	13½	12½	13½	13	13½	12½	....	....	12½	12	....	....	....
Amalgamated	100	58½	57¾	58¾	57¾	59½	57¾	59½	57¾	59½	58	....	....	....
American Zinc.	25	....	....	....	....	11½	....	....	....	....	....	....	....	....
Anaconda	25	....	....	....	....	....	....	....	....	....	....	....	....	....
Arcadian	25	1	....	1	....	1	....	....	....	....	....	....	....	....
Atlantic	25	13½	13	13	....	13½	....	13	....	13	....	....	....	....
Bingham Con.	50	27½	27½	27½	....	....	....	....	....	27	....	....	....	....
Bonanza	10	50	....	45	....	....	....	50	....	....	....	....	....	....
Boston Con	5	7	....	7¼	7	7	6¾	7	6¾	....	6¾	....	....	....
Calumet & Hecla	25	520	515	519	....	520	515	....	....	515	....	....	....	....
Catalpa	10	....	....	....	....	....	....	....	....	....	....	....	....	....
Centennial	25	28	27½	27¾	27½	27½	27¼	27½	27	27¼	26½	....	....	....
Central Oil	25	....	....	....	....	....	....	....	....	....	....	....	....	....
Con. Mercur	5	30	28	27	25	....	....	....	....	....	....	....	....	....
Cont. Zinc	25	....	....	....	....	....	....	....	....	....	....	....	....	....
Copper Range	100	59½	58½	59½	58½	59	58½	58½	58	58½	57¾	....	....	....
Daly-West	20	14¾	14½	14½	14	14¼	15	....	....	14½	14	....	....	....
Dominion Coal	100	57¾	....	61½	61	....	....	....	....	59	58	....	....	....
Preferred	100	....	....	108½	....	....	....	....	....	....	....	....	....	....
Dominion I. & S	100	11½	....	11¼	11	....	....	....	....	....	....	....	....	....
Elm River	12	2¼	....	....	....	....	....	....	....	2¼	....	....	....	....
Franklin	25	9	8¼	....	....	....	....	....	....	....	....	....	....	....
Granby Con.	10	3	....	3	....	3	....	3	....	3	....	....	....	....
Guanajuato Con.	5	....	....	....	....	....	....	....	....	....	....	....	....	....
Isle Royal Con.	25	18¼	16¾	19	18¼	18¼	18¾	18¼	18¼	20	18	....	....	....
Mass Con	25	3¾	....	3¼	....	....	....	3¾	3 1/16	4¼	4	....	....	....
Mayflower	25	....	....	....	....	....	....	....	....	65	....	....	....	....
Michigan	25	6¾	6½	6¾	6½	....	....	6¾	6½	....	....	....	....	....
Mohawk	25	46¾	46½	46½	46	46	45½	46	45½	46¼	46	....	....	....
Mont. Coal & C	25	....	....	5¼	....	5¼	....	5¼	....	5	....	....	....	....
Mont. & Boston	5	....	....	....	....	....	....	1 3/32	....	....	....	....	....	....
New Iria, Q'sil	5	....	....	....	....	....	....	....	....	....	....	....	....	....
Old Colony	25	....	....	....	....	....	....	....	....	....	....	....	....	....
Old Dominion	25	15	....	15	....	....	....	....	....	....	....	....	....	....
Osceola	25	80¾	79¼	81	80	80¼	79¼	....	....	80	79	....	....	....
Parrot	10	25	24¼	25	....	25	24¼	....	....	24½	24¼	....	....	....
Phœnix Con.	25	2¼	....	2¼	....	2¼	....	....	....	....	....	....	....	....
Quincy	25	....	....	92	91½	91	....	....	....	91½	....	92	....	....
Rhode Island	25	....	....	....	....	....	....	....	....	80⅝	....	85	....	....
Santa Fe	10	....	....	....	....	....	....	....	....	....	....	....	....	....
Shannon	10	4¼	4¼	4¼	4⅛	4⅛	4	4⅛	4	4⅛	4	4¼	3⅞	....
Tamarack	25	116	115	120	119	118	....	119	118	119	117	....	....	....
Tecumseh	25	....	....	....	....	....	....	....	....	....	....	....	....	....
Trinity	25	7¼	6¾	7¼	7	7¼	6¾	....	....	7	6¾	....	....	....
Union Coal	....	....	....	....	....	....	....	....	....	2	....	....	....	....
United States	10	21½	19¾	20½	19¾	20	19¾	20	19¾	20	19¾	....	....	....
U.S.Coal & Oil	25	11¼	11¼	11¼	11¼	....	....	....	....	11¼	....	....	....	....
Utah Con	5	41¼	40¾	41¼	40¾	40¾	40½	40¾	40¾	40¾	40½	....	....	....
Victoria	25	3¾	3½	4¼	4	4¼	4¼	4	4	4¼	4¼	....	....	....
Winona	25	9¼	9	9¼	....	9¼	....	9¼	....	9¼	8¼	....	....	....
*Wolverine	25	....	....	92½	92	88	....	89	....	88	87	....	....	....
Wyandot	25	75	....	75	....	75	70	80	75	80	75	....	....	....

Total sales, 132,379 shares. *Ex-dividend. †Assessment paid.

COLORADO SPRINGS, COLO.

Company.	Par val.	Sept. 10 H.	Sept. 10 L.	Sept. 12 H.	Sept. 12 L.	Sept. 13 H.	Sept. 13 L.	Sept. 14 H.	Sept. 14 L.	Sept. 15 H.	Sept. 15 L.	Sept 16 H.	Sept 16 L.	Sales.
Acacia	$1	.06½	.06	.06½	.06	.06½	.06½	.06½	.06	.06½	.06	....	....	....
Anaconda	5	.11½	.11	.11½	.11	.11½	.11	.11½	.11	.11½	.11	....	....	....
Colo. City & M.	1	.0075	.01½	.007	....	....	....	.01½	.007	.01½	.007	....	....	....
C. K & N.	1	.30	....	.36	.30	.30	....	.35	.29	.35	.33½	....	....	....
Cripple Ck Con	1	.09	.08¾	.09¼	.08¾	.09	.08¾	.09¼	.08½	.09¼	.09	....	....	....
Des Moines	1	.02	.01½	.02	.01½	.02	.01½	.02	.01	.02	.01½	....	....	....
Doctor-Jack Pot	1	.04¼	.04¼	.04¼	.04¼	.04¼	.04¼	.05	.04¼	.04¼	.04¼	....	....	....
Elkton Con.	1	.65	.64¼	.64¼	.64¼	.64¼	.64¼	.64¼	.64¼	.65½	.65	....	....	....
El Paso	1	.96¼	.96	.96½	.96	.96½	.95½	.97¼	.96½	.94¼	.94½	....	....	....
Gold Dollar Con.	1	.07½	.07¼	.07¼	.07¼	.07¼	.07	.07¼	.07	.06¼	.06½	....	....	....
Gold Sovereign	1	.05½	.05¼	.05½	.05¼	.05½	.05¼	.05½	.05¼	.05½	.05¼	....	....	....
Golden Cycle	1	.45	.40	.45	.40	.45	.40	.45	.40	.45	.40	....	....	....
Hart	1	.03¼	.02	.03¼	.02	.03¼	.02	.03	.02	.04	.02	....	....	....
Isabella	1	.21½	.20¾	.21	....	.21½	....	.21½	.20¾	.25¾	....	....	....	....
Jack Pot	1	.05	.03	....	....	.04¼	.03	.05	.03½	.05	.03	....	....	....
Keystone	1	.04¾	.04¼	.04¾	.04¼	.04¼	.04¼	.04¼	.04¼	.05	.04¼	....	....	....
Last Dollar	1	.40	....	.40	....	.35	.15	.25	.15	.40	....	....	....	....
Lexington	1	.03¾	.03¼	.04	.03¼	.03¾	.03¼	.03¾	.03¼	.03¾	.03¼	....	....	....
Little Puck	1	.04¼	.04	.04¼	.03¾	.04	.03¾	.04¼	.03½	.03¾	.03¼	....	....	....
Mollie Gibson	1	.04½	....	.04¾	....	.04½	....	.04½	.03¾	.04½	.04	....	....	....
Moon-Anchor	5	.07½	.06½	.07½	.06½	.07½	.06	.07½	.06	.08¼	.07	....	....	....
New Haven	5	.03¾	.03½	.03½	.03¼	.03¾	.03¼	.03½	.03¼	.03¾	.03	....	....	....
Old Gold	1	.10½	.10	.11	.09¾	.11	.09¾	.11	.09¾	.10¾	.09¾	....	....	....
Pharmacist	1	.03¾	.03¼	.03¾	.03¼	.03¾	.03¼	.03½	.03¼	.03¾	.03¼	....	....	....
Portland	1	1.66	1.60	1.65	1.63	1.65	1.64	1.65	....	1.70	1.60	....	....	....
Vindicator Con	1	.68	.62	.68	.62	.68	.62	.68	.62	.67	.62	....	....	....
Work	1	.09¾	.09	.09¾	.09	.09¾	.09	.09¾	.08¾	.10	.09	....	....	....

COLORADO SPRINGS (By Telegraph.)

Company.	Sept. 19 H.	Sept. 19 L.	Sept. 20 H.	Sept. 20 L.	Company.	Sept. 19 H.	Sept. 19 L.	Sept. 20 H.	Sept. 20 L.
Anaconda	.10	....	.11½	.11	Jack Pot	.04½	.03¾	.04½	.03¾
Cripple Ck. Con.	.09	.08½	.08¾	.08½	Last Dollar	.40	....	....	....
C. K. & N.	.30	.20	....	....	Mollie Gibson	.04½	....	....	....
Doctor Jack Pot	....	....	.04½	.04½	Moon Anchor	.07½	.06½	.07½	.06
Elkton Con	.64½	.64	.64½	.63½	Old Gold	.10	.09½	.09½	.09¼
El Paso	.95½	.94¾	.95	.94½	Pharmacist	.03¾	.03¼	.03¾	03
Gold Dollar	.07½	.06½	.07	.06½	Portland	1.65	1.60	1.65	1 55
Gold Sovereign	.05½	.05¼	....	....	Vindicator Con	.68	.62	.68	62
Isabella	.20½	.19½	.20½	.19	Work	.08¼	....	.08¾	.08½

PHILADELPHIA, PA.

Company.	Par val.	Sept. 14 H.	Sept. 14 L.	Sept. 15 H.	Sept. 15 L.	Sept. 16 H.	Sept. 16 L.	Sept. 17 H.	Sept. 17 L.	Sept. 19 H.	Sept. 19 L.	Sept. 20 H.	Sept. 20 L.	Sales.
*Cambria Iron	$50	....	....	....	....	46¾	....	....	....	....	....	....	....	100
Cambria Steel	50	22½	21¼	22¼	22¼	22¼	22¼	23¼	22¼	22¼	22¼	22	21¼	6,057
Int. Smokel's Pwd.	100	18¾	....	18¾	....	....	....	....	....	....	....	18	....	310
Preferred	100	....	....	....	....	....	....	....	....	....	....	....	....	....
Lehigh C. & N.	50	82	....	82	81¾	....	....	....	....	82	....	82	....	367
Mont. Tonopah	1	....	....	1.60	1.50	1.70	....	1.90	....	2.00	....	....	....	....
Philadelphia	50	42¾	41¾	42¾	42	42¼	41¾	42	....	41¾	41¾	41½	40¾	7,040
Preferred	50	44¾	....	45	44¾	45	....	45	....	45½	....	45	45	291
Tonopah	100	8.00	7.94	7.87	7.62	7.81	....	....	....	8.00	7.75	....	....	....
Tonopah-Belm't	1	....	....	60	....	....	....	....	....	60	....	....	....	....
United Gas	50	97½	96¾	96¾	96	95¾	94¾	95	94¾	94¼	94	94¼	94¼	10,210
Westmoreland C	50	....	....	....	....	....	....	....	....	....	....	....	....	....

Total sales, 24,685 shares. *Ex-dividend.

STOCK QUOTATIONS.

ST. LOUIS, MO.* Sept. 17

Company.	Par Val.	Bid.	Ask.	Company.	Par Val.	Bid.	Ask.
Am. Nettie, Colo	$10	$0.15	$0.25	Columbia Lead, Mo.	$10	$0.25	$1.00
Catherine Lead, Mo.	10	.50	2.00	Con. Coal, Ill	100	14.00	15.50
Central Coal & C.	100	64.50	65.50	Doe Run Lead Mo.	100	110.00	115.00
Central C. & C., Pf	100	71.50	73.00	Granite, Bimet Mt.	10	.30	.45
Central Lead, Mo.	100	110.00	117.00	St. Joe Lead, Mo	10	14.00	14.75

*By our Special Correspondent.

SALT LAKE CITY.* Sept. 17

Company	Par Val	High	Low	Sales	Company	Par Val	High	Low	Sales
Butler-Liberal		$ .10	$ .10	1,000	N. Y. Bonanza	$ 1	.03½	.2½	9,800
Carisa	$ 1	.10	.10	1,000	Petro		.06½	.06½	1,500
Columbus Con.		1.21½	1.20	200	Sacramento		.13½	.12	7,400
Daly Judge	1	4.50	4.45	200	Star Con.	1	.14½	.14	8,000
Daly West	20	15.00	14.25	205	Tetro	1	.27½	.27	2,600
Eagle & Blue Bell.		.75	75	1,000	Uncle Sam Con.	1	.23	.22	2,500
Little Chief		.01	.01	1,500	Utah		.42	.42	200
May Day	25	.08¼	.06½	48,660	Victoria		1.02½	1.02½	200
Martha Wash'gton		.00½	.00½	2,000					

*By our Special Correspondent. Total sales, 87,965 shares.

DULUTH, MINN. Sept. 1

Company	Par Val	Bid	Ask	Company	Par Val	Bid	Ask
Calumet & Arizona	$10	$95.00	$97.00	Lake Sup. & Pitts	$10	$31.00	$32.50
Calumet & Bisbee	10		2.00	Pitts. & Duluth Dev.	15	27.50	30.00
Calumet & Pittsburg	10	30.00	30.50	Shakespeare	10		.20
Higgins Development.	10		1.00	United Mexican	10		.50
Junction Development	15	30.00	31.00	Wolverine & Arizona.	10		2.00

MONTREAL.* Sept. 16

Company	Par Val	High	Low	Sales	Company	Par Val	High	Low	Sales
Dominion Coal	100	61.50	57.50	780	Montreal Steel	100	40.00	35.00	
Dom. Coal, Pf.	100	102.50		10	Mont'l Steel, Pf.	100	85.00	75.00	
Dom. I. & St.	100	11.75	11.00	610	Nova Scotia St.	100	67.50	63.75	1,937
Dom. I. & St., Pf	100	37.00	35.00	164	N. S Steel, Pf.	100	107.50		5
Internat'l Coal	100	100.00			Ogilvie	100	200.00	180.00	
Int'l Coal, Pf.	100	100.00			Ogilvie, Pf.	100	122.00	117.50	

*Montreal Stock Exchange. Total sales 3,506 shares.

MEXICO. Sept. 16

Company	Shares Issued	Prices, Mex. Bid.	Prices, Mex. Ask.	Company	Shares Issued	Prices, Mex. Bid.	Prices, Mex. Ask.
DURANGO				San Rafael y An., aviada	1,200	$720	$740
Ca. Min de Penoles	2,500	$2,700	$3,200	Soledad, aviada	670	935	940
San Andres de la Sierra	200	10,000		Sorpresa, aviada	960	305	310
GUANAJUATO:				MEXICO:			
Angustias, Pozos	2,400	30	35	Alacran	2,400	20	28
Cinco Senores y An. aviadoras	2,000	33	35	Aldeharren	2 000	62	65
Cinco, Senores y An. aviada	400	33	35	Buen Despacho	3 000	58	64
Providencia, San Juan de la Luz	6,000	53	58	Dos Estrellas	3,000	2,010	2,050
Queensland y Australia	300	8	12	La Esperanza (El Oro)	3,000	1,500	1,500
GUERRERO:				La Reformia aviadores	2,000	32	35
Delfina, 1st serie	2,500	30	35	Santa Ana, Esperanza	2,400	60	80
Delfina, 2nd serie	2,500	25	30	MICHOACAN:			
Garduno y Anexas	7,200	35	40	Luz de Borda, aviadora	3,000	10	15
HIDALGO:				Luz de Borda, aviado	1,000	10	15
Amistad y Concordia	9,600	72	74	Santiago y An., Tlal	4,000	7	10
Carmen, aviada	1,100	110	130	NUEVO LEON:			
GuadalupeFresnillo Mill	1,000	170	200	La Fraternal	1,000	580	620
GuadalupeFresnillo Mine	1,400	70	80	Norias de Bajan	1,000	880	920
La Reina y An. aviadora	5,600	3	5	SAN LUIS POTOSI:			
Luz de Maravillas, aviadas	1,100	...	20	Concepcion y An	3,000	50	55
Maravillas y An., aviador	1,680	110	150	El Barreno, aviadora	2,000	80	82
Maravillas el Lobo	1,000	130	180	Sta Maria de la Paz	9,600	190	200
Palma y An., aviador	1,800	4	8	San Diegoy Annexas	2,400	6	10
Refugio, aviada	12,800	680	740	ZACATECAS:			
Santa Anay An., aviadora	800	50	70	Asturiana y An.	2,500	10	18
Santa Anay An., aviada	600	25	35	Candelaria y Pinos	2,500	40	50
Sta. Gertrudis y An aviadas	9,600	12	14	Esperanza y An.	2,400	6	8
Sta Gertrudis y An. aviadora	28,800	75	76½	Lourdes	2,500		
Santo Tomas Apostol aviadoras	5,100	2	3	Luz de Minillas, pagadoras	2,000		
San Felipe de Jesus aviadora	3,600	13	15	Nueva Quebradilla, aviadoras	2,400	16	25
San Felipe de Jesus aviada	1,200	5	6	Nueva Quebradilla, aviadas	600	20	30
San Rafael y An. Trompillo	1,200	1,940	1,980	San Carlos y Annexas	2,500	55	65
				Sta. Maria de Gaud.	2,500	85	92
				MISCELLANEOUS			
				Bartolome de Medina	2,000	98	102
				Naica (Chihuahua)	100	11,000	13,000
				Natividad(Oaxaca) aviadora	1,800	950	1,000
				San Francisco Hac	6 000	112	118
				Union Hacienda	3,000	325	360

LONDON. Sept. 8

Company.	Shares Issued.	Par value.	Latest dividend. Amt.	Latest dividend. Date.	Quotations. Buyers.	Quotations. Sellers.
		£ s. d.	s. d.		£ s. d.	£ s. d.
American:						
Alaska-Treadwell	200,000	5 0 0	2 0	July, 1904	4 12 6	4 17 6
Anaconda	1,200,000	5 0 0	2 0	May, 1904	4 1 3	4 3 9
Camp Bird	820,000	1 0 0	9	Aug., 1904	1 8 3	1 8 9
Copiapo	112,500	2 0 0	6 10	May, 1903	1 0 0	1 5 0
De Lamar	80,000	1 0 0	1 6	May, 1904	13 9	16 3
El Oro	1,080,000	1 0 0	9	July, 1904	1 1 3	1 3 9
Esperanza	455,000	1 0 0	6	Aug., 1904		
Frontino & Bolivia	128,662	1 0 0	3 0	July, 1901	8 0	10 0
Le Roi	200,000	5 0 0	5 0	Nov., 1899	13 9	16 3
Le Roi No. 2	120,000	5 0 0	1 0	June, 1904	11 3	12 9
Palmarejo & Mexican	445,000	1 0 0	rts.	Apr., 1903	8 3	8 9
Standard	500,000	4 0	2½	Sept., 1903	2 0	3 0
Stratton's Independence	1,000,007	1 0 0	6	Dec., 1903	2 3	2 9
St. John del Rey	546,265	1 0 0	6	Dec., 1903	10 6	11 6
Tomboy	300,000	1 0 0	1 0	June, 1902	1 0 0	1 5 0
Ymir	200,000	1 0 0	1 0	Mar., 1902	2 6	5 0
European:						
Linares	15,000	3 0 0	5 0	Sept., 1904	3 10 0	4 0 0
Mason & Barry	185,172	1 0 0	7 0	May, 1904	2 17 6	3 2 6
Rio Tinto	325 000	5 0 0	37 6	May, 1904	54 17 6	55 2 6
Rio Tinto, preferred	325,000	5 0 0	2 6	May, 1904	6 0 0	6 5 0
Tharsis	625,000	2 0 0	7 0	May, 1904	4 2 6	4 7 6
West Australian:						
Associated	495,388	1 0 0	2 6	July, 1904	1 13 9	1 16 3
Cosmopolitan	400.000	1 0 0	1 0	Apr., 1904	6 0	7 0
*Golden Horseshoe	300,000	5 0 0	6 0	Aug., 1904	6 2 6	6 5 0
Great Boulder	1.750,000	2 0	9	Sept., 1904	17 3	17 9
Gt. Boulder Persever'ce	1,400 007	1 0 0	1 0	Sept., 1904	11 6	12 0
Great Pingall	250,000	1 0 0	7 0	July, 1904	7 7 6	7 10 0
Ivanhoe	200,000	5 0 0	5 0	July, 1904	6 17 6	7 0 0
Kalgurli	120,000	1 0 0	2 6	July, 1904	4 17 6	5 0 0
Lake View	250 000	1 0 0	rts.	Aug., 1902	1 0 0	1 2 6
Oroya-Brownhill	450,000	1 0 0	3 0	Sept., 1904	3 3 9	3 6 3
Miscellaneous:						
*Brilliant Central	100,000	1 0 0	1 0	Sept., 1904	2 6 3	2 8 9
Briseis	600,000	1 0 0			9 3	9 9
*Broken Hill	960,000	8 0	1 0	Aug., 1904	1 19 0	2 0 0
Mt. Lyell	275,000	3 0 0	1 3	June, 1904	12 6	13 6
Mt. Morgan	1,000,000	1 0 0	3	Sept., 1904	2 0 0	2 2 6
Waihi	497,412	1 0 0	2 6	Sept., 1904	5 10 0	5 12 6
Indian						
Champion Reef	513,832	10 0	1 4	Sept., 1904	1 12 6	1 13 6
Mysore	566.043	10 0	4 6	July, 1904	6 8 9	6 11 3
Nundydroog	484,000	10 0	1 3	July, 1904	1 12 6	1 15 0
Ooregum	343,000	10 0	1 3	Aug., 1904	16 6	17 6
Ooregum, pfd	240,000	10 0	4	Aug., 1904	1 8 9	1 11 3
South African:						
Angelo	600.000	1 0 0	7 0	Aug., 1904	6 16 3	6 18 9
Bonanza	200,000	1 0 0	8 0	Aug., 1904	1 2 6	1 5 0
British South Africa	4,436,019	1 0 0	rts	May, 1899	1 11 3	1 13 9
Cape Copper	300.000	2 0 0	2 6	July, 1904	3 3 9	3 6 3
Cape Copper, pfd	75.000	2 0 0	2 6	July, 1904	3 2 6	3 7 6
City & Suburban	340,000	4 0 0	4 0	Aug., 1904	4 15 0	5 0 0
Consol. Gold-Fields	2,000,000	1 0 0			6 2 6	6 5 0
Crown Reef	120,000	1 0 0	6 0	Aug., 1904	14 10 0	15 0 0
De Beers, preferred	800,000	2 10 0	10 0	Aug., 1904	18 11 3	18 13 9
De Beers, deferred	1,000,000	2 10 0	12 6	Aug., 1904	18 13 9	18 16 3
East Rand	990,000	1 0 0	5 0	July, 1903	8 0 0	8 1 3
Ferreira	90,000	1 0 0	22 6	Aug., 1904	20 5 0	20 15 0
Geldenhuis	200 000	1 0 0	7 0	Aug., 1904	5 8 9	5 11 3
Geduld	400 000	1 0 0	rts.	Mar., 1902	6 5 0	6 7 6
Henry Nourse	125,000	1 0 0	8 0	Aug., 1904	8 0 0	8 5 0
*Jubilee	50,000	1 0 0	5 0	Aug., 1904	4 12 6	4 17 6
Jumpers	100,000	1 0 0	2 6	May, 1904	2 15 0	3 0 0
Langlaagte	470,000	1 0 0	2 0	Aug., 1904	3 11 3	3 13 9
May	288,750	1 0 0	3 0	Aug., 1904	3 18 9	4 1 3
Meyer & Charlton	100,000	1 0 0	5 0	Aug., 1904	5 5 0	5 10 0
Modderfontein	290,000	1 0 0	rts	Apr., 1902	8 11 3	8 13 9
Namaqua	94,331	2 0 0	3 0	Dec., 1903	2 15 0	3 0 0
New Jagersfontein	200,000	5 0 0	10 0	June, 1904	27 5 0	27 15 0
*New Primrose	325,000	1 0 0	3 0	Aug., 1904	3 12 6	3 15 0
Rand	1,795,956	5 0	5 0	Aug., 1902	10 1 3	10 3 9
Robinson	750,000	5 0 0	6 0	Aug., 1904	9 2 6	9 7 6
*Robinson Deep	950,000	1 0 0	3 0	Aug., 1904	5 6 3	5 8 9
Rose Deep	425 000	1 0 0	3 0	Aug., 1904	8 12 6	8 15 0
Salisbury	100,000	1 0 0	2 0	Sept., 1904	1 15 0	1 17 6
Village Main Reef	400,000	1 0 0	4 0	July, 1904	6 7 6	6 8 9
Wemmer	80,000	1 0 0	12 6	July, 1904	10 15 0	11 5 0

*Ex-dividend.

LONDON (By Cable.)*

Company	Sept. 14 £	Sept. 14 s.	Sept. 14 d.	Sept. 21 £	Sept. 21 s.	Sept. 21 d.	Company	Sept. 14 £	Sept. 14 s.	Sept. 14 d.	Sept. 21 £	Sept. 21 s.	Sept. 21 d.
Camp Bird	1	8	6	1	8	3	Esperanza		19	0		19	0
Con. Gold Fields	6	2	6	6	2	6	Modderfontein	8	12	6	8	13	9
De Beers	18	15	0	18	12	6	Rand Mines	10	2	6	10	3	9
Dolores	1	2	6	1	5	0	Rio Tinto	55	0	0	56	10	0
East Rand	1	13	1½	1	8	3	Simmer & Jack	1	13	0	1	13	9
El Oro	1	2	6	1	1	10½	Tomboy	1	1	3	1	0	0

*Furnished by Wm. P Bonbright & Co., 15 Wall St., New York

PARIS. Sept. 8.

Company.	Location.	Capital Stock.	Par value.	Latest dividend	Prices. Opening	Prices. Closing
		Francs.	Fr.	Fr.	Fr.	Fr.
Anzin, Coal	France			290.00	5 750 00	5 750 00
Boleo, c	Lower Cal.	12,000,000	500	104.17	2 019 00	2,070 00
Champ d'Or, g	S. Africa	3.375.000	25	3 75	17 50	16 75
Courrieres, Coal	France	600,000	500	110.00	2,885 00	2,885 00
Fraser River, g	Brit. Col.	250,000	25		5.50	5.50
Huanchaca, s	Bolivia	40,000,000	125	2.50	95 75	93 50
Laurium, z. l	Greece	16,300,000	500	25 00	300.00	306.00
Malfidano, s	Italy	12,500 000	500	50 00	618 00	625 00
Metaux, Cie. Fran. de	France	25,000,000	500	22.50	491 00	500 00
Mokta-el-Hadid, i. l	Algeria	18,312,000	500	40.00	947 00	975.00
Nickel, n	N Caledonia	15,000,000	250	22.50	594 00	595.00
Penarrova, Coal	Spain		500	45 00	1,120.00	1,130 00
Vieille Montagne s	Belgium	9,000,000	30	30.00	740.00	790.00

c—Copper. g—Gold i—Iron. l—Lead. n—Nickel. o—Oil. s—Silver. z—Zinc.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

ABRASIVES—		
Bort as to size	carat,	$10.00@$18.00
Carborundum, f.o.b. Niagara Falls, Powd	lb.	.08
Grains	"	.10
Corundum, N. C	"	.07@.10
Chester, Mass	"	.04½@.05
Barry's Bay, Ont	"	.07½@.09½
Mont. f.o.b. Chicago	"	.07@.07½
Crushed Steel, f.o.b. Pittsburg	"	.05½
Emery, in kegs: Turkish flour	"	.03½
Grains	"	.05@.05½
Naxos flour	"	.03½
Grains	"	.05@.05½
Chester flour	"	.03½
Grains	"	.05@.05½
Peekskill, f.o.b. Easton, Pa., flour	"	.01½
Grains, in kegs	"	.02½
Crude, ex-ship N. Y.; Abbott (Turkey)	lg. ton	26.50@30.00
Kuluk (Turkey)	"	22.00@24.00
Naxos(Greek)h.gr	"	26.00
Garnet, per quality	sh. ton	25.00@35.00
Pumice Stone,Am.Powd	lb.	.01½@.02
Italian, powdered	"	.01½
Lump, per quality	"	.04@.05
Rottenstone, ground	"	.02½@.04½
Lump, per quality	"	.06@.20
Rouge, per quality	"	.10@.30
Steel Emery, f.o.b. Pittsburg	"	.07
ACIDS—		
Boracic, crystals	"	.10
Powdered	"	.10½
Carbonic, liquid gas	"	.12½
Chromic, crude	"	.19
Hydrofluoric, 30%	"	.03
48%	"	.05
60%	"	.11
Sulphurous, liquid anhy. f.o.b. Bound Brook, N. J.	"	.06
ALCOHOL—Grain	gal.	2.42@2.44
Refined wood, 95@97%	"	.60@.65
Purified	"	1.25@1.30
ALUM—Lump	100 lb.	1.75
Ground	"	1.85
Porous	"	1.00
Powdered	"	3.00
Chrome, com'l	"	2.75@3.00
ALUMINUM—		
Nitrate	lb.	1.50
Oxide, com'l, common	"	.06½
Best	"	.20
Pure	"	.80
Hydrated	100 lb.	2.60
Sulphate, com'l	"	1.25@1.50
AMMONIA—		
Aqua 16°	lb.	.02½
18°	"	.02½
20	"	.03½
26	"	.05
AMMONIUM—		
Carbonate, lump	"	.07½
Powdered	"	.08½
Muriate gram	"	.05½
Lump	"	.09½
Nitrate, white pure (99%)	"	.12
Phosphate, com'l	"	.09
Pure	"	.12
ANTIMONY—Glass	"	.30@.40
Needle, lump	"	.05½@.06
Powdered, ordinary	"	.05½@.07½
Oxide, com'l white, 95%	"	.09½
Com'l gray	"	.07
Sulphuret, com'l	"	.16
ARSENIC—White	"	.02½@.03½
Red	"	.06½@.06½
ASPHALTUM—		
Barbadoes	"	.02½@.03
Cuban	"	.01½@.03½
Egyptian, crude	"	.06@.07
Gilsonite, Utah, ordin'y.	"	.03
Select	"	.03½
San Valentino (Italian)	lg. ton	16.00
Seyssel (French), mastic	"	21.00
Trinidad, refined	"	35.00
Ventura, Cal	"	32.00
BARIUM—		
Carb.Lump,80@90%	sh.ton	$25.00@$27.00
92@98%	"	26.00@29.00
Powdered, 80@90%	lb.	.01½@.02
Chloride, com'l	100 lb.	1.50@1.70
Chem. pure cryst	lb.	.05
Nitrate, powdered	"	.05½
Sulphate (Blanc Fixe)	"	.02
BARYTES—		
Am. Crude, No. 1	sh. ton	9.75
Crude, No. 2	"	8.00
Crude, No. 3	"	7.00
Snow-white	"	16.25@16.75
Floated	"	18.25
Foreign gray	"	13.50
Snow-white	"	17.25
Floated	"	18.75
BAUXITE—Ga. or Ala. Mines:		
First grade	lg. ton	5.25@5.50
Second grade	"	4.50@4.75
BISMUTH—Subnitrate	lb.	2.00
Subcarbonate	"	2.25
BITUMEN—"B"	"	.03½
"A"	"	.05
BONE ASH	"	.02½@.02½
BORAX	"	.07½@.07¾
BROMINE—Bulk	"	.48
CADMIUM—Metallic	"	1.40
Sulphate	100 lb	2.00@2.50
CALCIUM—Acetate, gray	"	1.75
Acetate, brown	"	1.25
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh. ton	65.00
Carbonate, ppt	lb.	.05
Chloride	100 lb.	.70@.90
CEMENT—		
Portland, Am., 400 lb.	bbl.	.90@1.25
Foreign	"	1.25@1.75
"Rosendale," 300 lb.	"	.80
Slag cement	"	.75@1.25
CERESINE—		
Orange and Yellow	lb.	.13½
White	"	.15
CHALK—Lump, bulk	sh. ton	3.00
Ppt. per quality	lb.	.04@.05½
CHLORINE—Liquid	"	.30
Water	"	.10
CHROME ORE— (50%ch.) ex-ship N. Y.	lg. ton	19.00@19.50
Bricks, f.o.b. Pittsburg	M	175.00
CLAY, CHINA—Am. com., ex-dock, N. Y	lg. ton	8.25
Am. best, ex-dock, N. Y.	"	9.25
English, common	"	10.75
Best grade	"	16.75
Fire Clay, ordinary	sh. ton	4.25
Best	"	6.00
Slip Clay	"	5.00
COAL TAR PITCH	gal.	.08
COBALT—Carbonate	lb.	1.75
Nitrate	"	1.50
Oxide—Black	"	2.50
Smalt, blue ordinary	"	.06
Best	"	.20
COPPERAS—Bulk	100 lb.	.47½
In bbls	"	.52½
COPPER—Carbonate	lb.	.18@.19
Chloride	"	.25
Nitrate, crystals	"	.35
Oxide, com'l	"	.19
CRYOLITE	"	.06½
EXPLOSIVES—		
Blasting powder, A	25-lb. keg	.65
Blasting powder, B	"	1.40
"Rackarock," A	lb.	1.40
"Rackarock," B	"	.18
Judson R.R. powder	"	.10
Dynamite (20% nitroglycerine)	"	.13
(30% nitro-glycerine)	"	.14
(40% nitro-glycerine)	"	.15
(50% nitro-glycerine)	"	.16½
(60% nitro-glycerine)	"	.18
(75% nitro-glycerine)	"	.21
Glycerine for nitro	"	.11½@.11½
FELDSPAR—Ground	sh. ton	10.00
FLINT PEBBLES—		
Danish, Best	lg. ton	14.75
French, Best	"	11.75
FLUORSPAR—		
Lump	sh.ton	8.00@10.00
Ground	"	11.50@13.50
FULLER'S EARTH—Lump	100 lb.	$0.80
Powdered	"	.85
GRAPHITE—Am. f. o. b. Providence, R. I., lump	sh. ton	8.00
Pulverized	"	30.00
Am. pulv., other than R. I., f. o. b., New York	"	45.00
Best flake	"	150.00
Ceylon, common pulv	lb.	.02½@.03½
Best, pulverized	"	.04@.08
German, com. pulv	"	.01½@.01½
Best pulverized	"	.01½@.02
Italian, pulverized	"	.01½
GYPSUM—Ground	sh. ton	8.00@8.50
Fertilizer	"	7.00
Rock	lg. ton	4.00
English and French	"	14.00@16.00
INFUSORIAL EARTH—		
Ground Am. best	"	20.00
French	"	37.50
German	"	40.00
IODINE—Crude	100 lb.	2.45
IRON—Muriate	lb.	.05
Nitrate, com'l	"	.01½
True	"	.04
Oxide, pure copperas color	"	.05@.10
Purple-brown	"	.02
Venetian red	"	.01@.01½
Scale	"	.01@.03
KAOLIN—(See China Clay.)		
LEAD—Acetate, white	lb.	.08½@.08¾
Brown	"	.06½@.06¾
Nitrate, com'l	"	.06½
" gran	"	.08½
LIME—Com., abt. 250 lb.	bbl.	.80
Finishing	"	1.00
MAGNESITE—Greece.		
Crude (95%)	lg. ton	5.00@5.50
Calcined	sh. ton	15.50
Bricks, best imp., f.o.b. N. Y.	M.	155.00
Bricks, domes.,per qual., f.o.b. Pittsburg	"	160@200
MAGNESIUM—		
Carbonate, light, fine pd.	lb.	.05
Blocks	"	.07@.09
Chloride, com'l	"	.01½
Fused	"	.20
Nitrate	"	.60
Sulphate	100 lb.	.55@.95
MANGANESE—		
Crude powd. 70@75% binoxide	lb.	.01½@.01½
75@85% binoxide	"	.01½@.02½
85@90% binoxide	"	.02½@.03½
90@95% binoxide	"	.03½@.05½
Carbonate	"	.16@.20
Chloride	"	.04
Ore	unit	.18@.20
MARBLE—Flour	sh. ton	6.00@7.00
MERCURY—Bichloride	lb.	.68
MICA—N.Y.gr'nd,coarse	sh.ton	33.00@38.00
Fine	lb.	.00½@.02
Sheets are sold as to size and quality.		
MINERAL WOOL—		
Slag, ordinary	sh. ton	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
NICKEL—Oxide, No. 1	lb.	1.00
No. 2	"	.60
Sulphate	"	.20@.21
OILS—Black, reduced 29 gr.		
25@30, cold test	gal.	.11@.12
15, cold test	"	.12@.13
Zero	"	.16½@.17½
Summer	"	.11@.12
Cylinder, dark steam ref.	"	.12½@.14
Dark, filtered	"	.16½@.17½
Light, filtered	"	.18½@.19½
Extra cold test	"	.23@.30
Gasoline, 86@90	"	.17@.22
Naphtha, crude,68°@72°	bbl.	12.40
"Stove"	gal.	.15
Linseed, domestic raw	"	.42@.45
Boiled	"	.47
Calcutta, raw	"	.65
OZOKERITE	lb.	.11½
PAINTS AND COLORS—		
Chrome green, common	"	.03
Pure	"	.16
Yellow, common	"	.10½
Best	"	.14
Lampblack, com'l	"	.04½
Refined	"	.07
Litharge, Am. pow'd	"	.05½@.06
English glassmakers'	"	.08½@.08½
Lithophone	"	.02½@.06½
Metallic, brown	sh. ton	19.00
Red	"	16.00
Ocher, Am. common	"	8.50@9.00
Best	"	21.25@25.00
Dutch, washed	lb.	.02½
French, washed	"	.01½@.01½
Orange mineral, Am.	"	.07½@.07½
Foreign, as to make	"	.08½@.10½
Paris green, pure, bulk	"	.11
Red lead, American	lb.	0.06½@0.06½
Foreign	"	.07@.08½
Turpentine, spirits	gal.	.55½
White lead, Am., dry	lb.	.05@.05½
American, in oil	"	.06@.06½
Foreign, in oil	"	.09@.09½
Zinc, white, Am., extra dry	"	.04½@.04½
Foreign, red seal, dry	"	.06@.08½
Green seal, dry	"	.06½@.09½
POTASH—		
Caustic, ordinary	lb.	.04½
Elect. (90%)	"	
POTASSIUM—		
Bicarbonate cryst	"	.08½
Powdered or gran	"	.14
Bichromate, Am.	"	.08½@.08¾
Scotch	"	.08½@.08¾
Bromide	"	.30
Carbonate (80@85%)	"	3.50@4.00
Chlorate, powdered	"	.06½@.07½
Crystals	"	.06½@.07
Chromate	"	.35
Cyanide (98@99%)	"	.19
Kainit	lg. ton	9.30
Manure salt, 20%	100 lb.	.66
Double Manure Salt, 48@53%	"	1.12
Muriate, 80@85%	"	1.83
95%	"	1.86
Permanganate	lb.	.09½@.09½
Prussiate, yellow	"	.14½@.14½
Red	"	.35½@.36
Sulphate, 90%	100 lb.	2.11
96%	"	2.14
Sylvinit	unit	.41
QUARTZ—(See Silica.)		
SALT—N. Y. com. fine 280 lb.	bbl.	.72@1.18
N. Y. agricultural	sh. ton	4.40
SALTPETRE—Crude	100 lb.	3.65
Refined	"	4.00@4.50
SILICA—		
Ground quartz, ord'ry	sh. ton	9.00@10.00
Best	"	12.00@13.00
Lump quartz	"	2.50@4.00
Glass sand	"	2.75
SILVER—Chloride	oz.	.65
Nitrate Crystals	"	.35
Oxide	"	.85@1.10
SODIUM—		
Bicarb., ord., bulk, f.o.b. works	100 lb.	1.30
Extra domes, f.o.b. works	"	3.50
Bichromate	lb.	.06½
Carbonated ash, high test, in bags, f.o.b. works	100 lb.	.75@.77½
Foreign, f.o.b. N. Y.	"	.85@.87½
Caustic, 70@76%, f.o.b. works	"	1.77½@1.85
Foreign, f.o.b. N. Y.	"	1.90@1.95
Chlorate, com'l	"	.06½@.06½
Hyposulphite, Am	"	1.60@1.65
German	"	1.70@1.90
Nitrate, spot and nearby	"	2.17½@2.22½
Shipments	"	2.22½@2.25
Peroxide	lb.	.45
Phosphate	"	.02½@.02½
Prussiate	"	.09½
Sal soda, f.o.b. works	100 lb.	.60
Foreign, f.o.b. N. Y.	"	.67½
Silicate, concentrated	lb.	.05
Com'l	"	.01
Sulphate, com'l	100 lb.	.60
Sulphide, crystals, bbl.	lb.	.01½
Sulphite crystals	"	.02½
SULPHUR—Roll	100 lb.	1.85
Flour	"	1.90
Flowers, sublimed	"	2.20
TALC—N. C., 1st grade	sh. ton	20.00
N. Y., Fibrous, best	"	10.25
French, best	100 lb.	2.50
Italian, best	"	2.25
TAR—Regular	bbl.	2.25
Oil,	"	4.75
TIN—Crystals, bbl.	lb.	.17
Oxide	"	.35
URANIUM—Oxide	"	2.25@3.00
ZINC—Metallic, ch. pure	"	.07@.09½
Carbonate, ppt	"	.09
Chloride solution, com'l	"	.02½
Chloride granular	"	.04½@.04½
Dust	"	.05½@.05½
Sulphate	"	.02 @.02½

The Rare Earths.

BORON—Nitrate	lb.	$1.50
CALCIUM—Tungstate (Scheelite)	"	.60
CERIUM—Nitrate	"	10.00
DIDYMIUM—Nitrate	"	35.00
ERBIUM—Nitrate	"	40.00
GLUCINUM—Nitrate	"	20.00
LANTHANUM—Nitrate	"	30.00
LITHIUM—Carbonate	"	1.50
LITHIUM—Nitrate	oz.	.00
STRONTIUM—Nitrate	lb.	.07@.07½
THORIUM—Nit. 49@50%	"	4.50
URANIUM—Nitrate	oz.	.25
ZIRCONIUM—Nitrate	lb.	8.00

NOTE.—These quotations are for wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. Readers of the ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.